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THE PAPER INDUSTRY

The Monthly Educational Journal of the Paper Industry.

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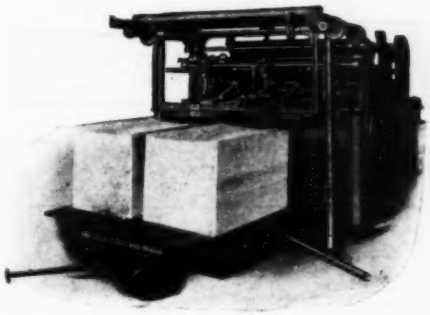

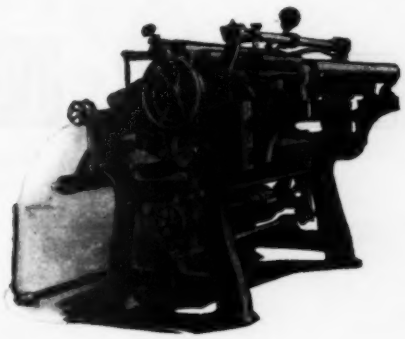

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Vol. 2—No. 5

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of The Paper Industry

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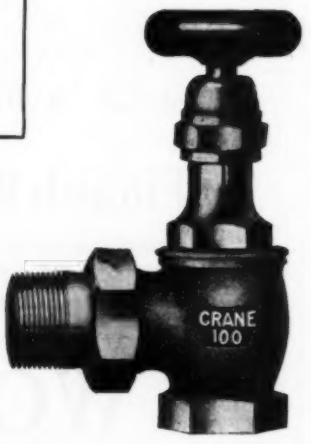

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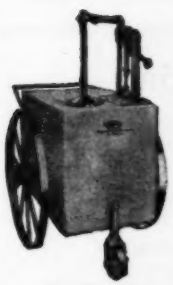

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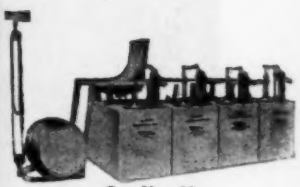

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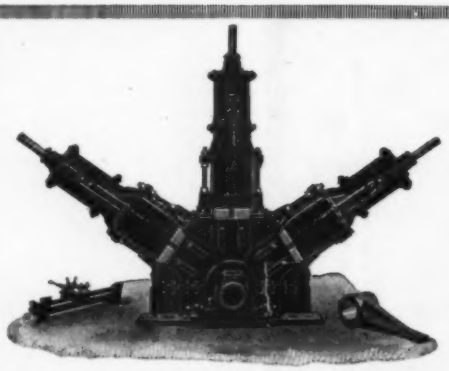

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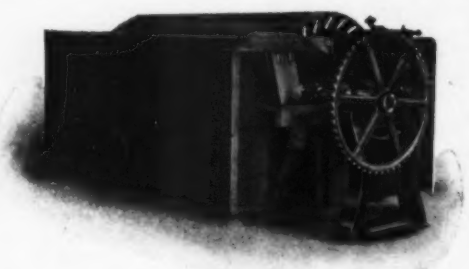

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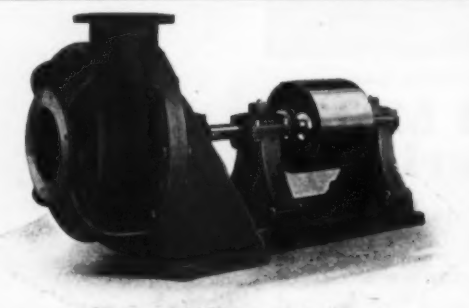

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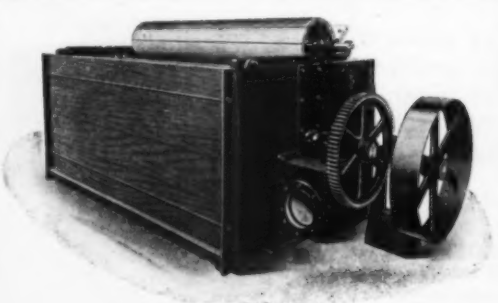

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EDITORIAL

The Technical Man

THE march of progress in the paper industry during the last ten years has been the result of bringing together the scientific investigations of the technical men in the industry with the practical experience of those in the manufacturing end of the business.

The enormous demands which have been made on the mills to produce more paper have made it necessary to build machinery of greater capacity and to contrive and execute more efficient methods of manufacturing the product.

Never was there a greater demand for inventive genius than there exists at the present.

The scarcity of wood has made it urgent to conserve what we have, and discover means by which to prevent deterioration in the pile and the pulp laps.

Making use of by-products from the processes of manufacturing pulp and paper has become of paramount interest, and is yet but in its infancy.

The demand for paper is unlimited, and, in fact, much beyond any prospects of fulfillment since it has been shown in how many ways it can be used. Not only is it the vehicle for the dissemination of light and truth, but all manner of commodities are manufactured from it.

So much is expected of this growing and promising industry that technical men are essential to its progress and development. Men who have the guidance of the future of papermaking must have a knowledge and understanding of the accomplishments of the past, and this is what the technical man obtains in his college training.

This does not mean, however, that the practical man with limited schooling is not just as necessary to the development of the industry as the one who has had the college training. The young man, who starts in early to become a papermaker and works his way to the superintendent's desk by sheer hard work and attention to business is the man who knows how to make good paper.

Each of these men is necessary to the other.

In order that the highest co-operation might exist between the two, each should become acquainted with the knowledge of the other, and by so doing they can speak on common terms.

A man leaving college and entering into the business of papermaking should have at least four years' training in the manufacturing end before entering the laboratory.

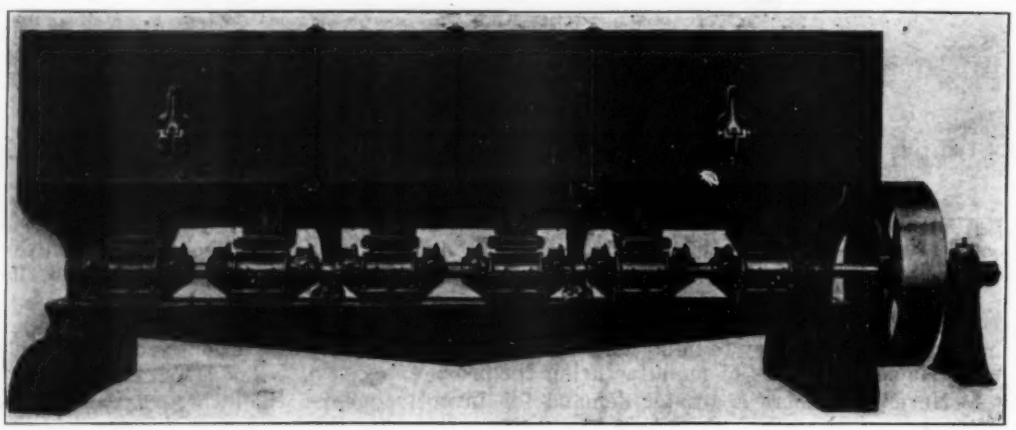
This idea should apply also to the young man who starts in early to learn his trade. The opportunity is at hand for him to acquire a technical training, and at the same time keep on with his work by attending some night school or taking a correspondence course.

Education is necessary in these days of fast achievement, and the overcrowded classes which are now being registered in the schools throughout the country are good indications of the fact that men are becoming cognizant of the value of school training.

AMBITION

Man was made for growth. It is the object, the explanation, of his being. To have an ambition to grow larger and broader every day, to push the horizon of ignorance a little further away, to become a little richer in knowledge, a little wiser, and more of a man —that is an ambition worth while.—Marden.

Pulp and Paper Mill Machinery



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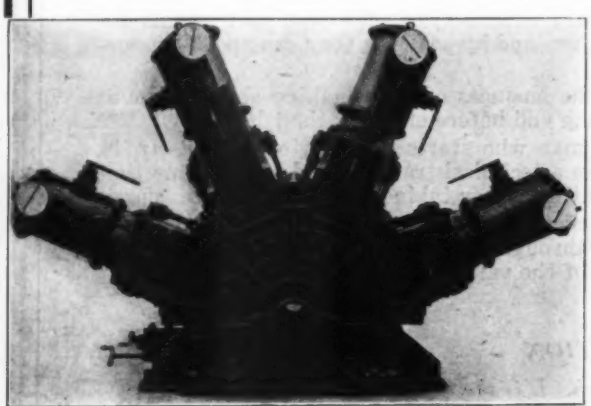

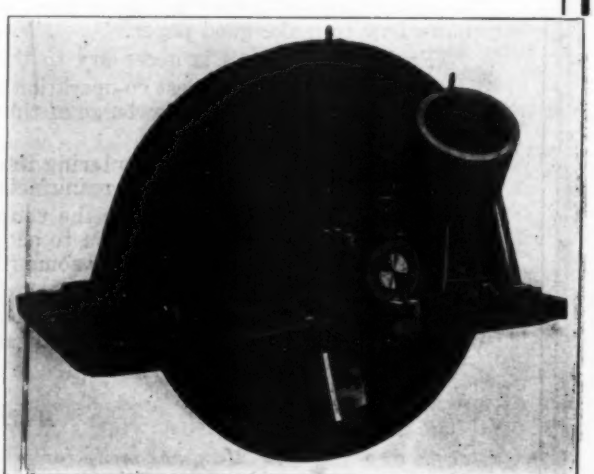

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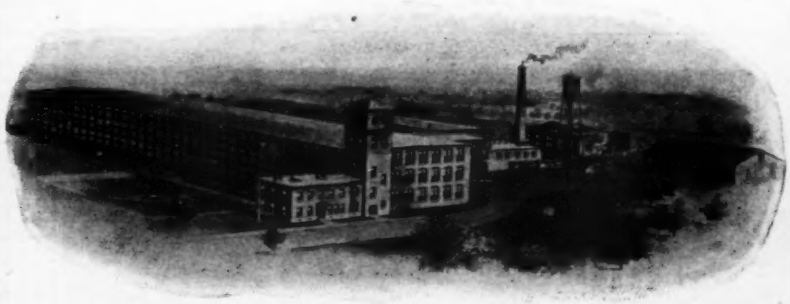

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(4) ***Assisting in the more economical maintenance and operation of the mills.***

A brief survey of how "A B C" Equipment, as applied to paper mills, is rendering this vital service, is given in our Bulletin "A B C Equipment for Paper Mills." Would you like a copy?

AMERICAN BLOWER COMPANY
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Reforestation

"WHERE is the supply of wood to come from for paper making in the future?" is the question that is often asked by those interested in the paper industry's future.

There seems to be only one rational answer to such a question, and that answer is "Reforestation," for no sane man can think of any plan whereby we will have any forests in the near future, if we destroy those that we now have, and do not plant more. You cannot destroy anything, and still have it, unless you build again, and this is equally true of our forests as of any other thing.

It is pitiful to go to some of the pulp mills and see the wood piles, or watch the cars as they come in laden with pulp wood, and note the size of some of the logs (?) that are used for making pulp. In fact many of them are not even baby logs, but mere saplings. We believe it not only to be the best policy for this country to take up the subject of reforestation, and do it whole-heartedly, but to stop the cutting of trees, that after the bark has been taken off, there is not much left for making pulp. These trees, if left to stand a few years longer, would develop into something that would be worth while, but as they are today, it seems a crime to use them.

Then, too, it seems that if the cutting down of thousands, and possibly millions of small pine trees that are used at Christmas time every year was stopped, this would help considerably.

There should, also, be greater care used in the matter of forest fires, which annually destroy so much good material for paper making as well as for other purposes.

All of these things are badly needed, and yet if all of them had the greatest care, still in a few years our paper making forests will be gone. This is nearly true now.

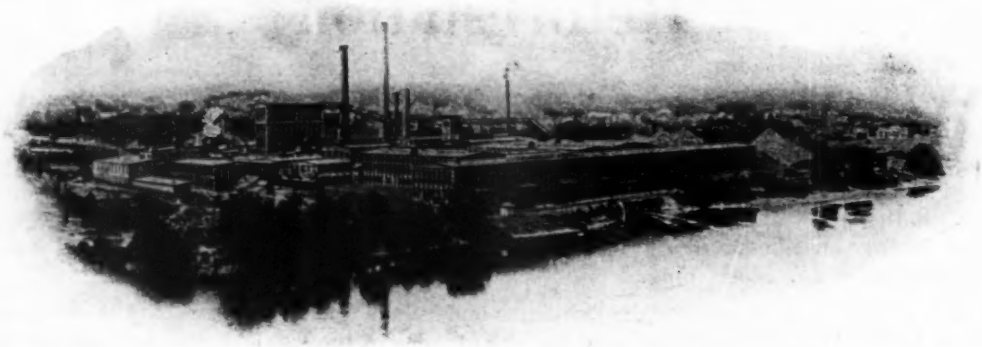
So where is the future wood to come from? The answer seems plain—in reforestation.

The paper industry, as well as all other wood working industries, should get together and bend every effort to have Congress adopt a program of reforestation, and every individual or company that has land suitable for this purpose, should go to it alone. At the end of another decade we would begin to have an everlasting supply, if the policy was adopted to plant two trees whenever one was cut down. It is interesting to note that the New York State College of Forestry, at Syracuse, New York, has been doing considerable work and investigation along these lines, to determine the best plan to pursue. This work has been done at the Ranger School at Wanakena, New York, and they have in the last four years planted on the school forest a total of nearly 150,000 trees.

Director Robert Craig, Jr., in a report to Dean Franklin Moon of the New York State College of Forestry, says that "after four years it is now possible to begin to give data and results of the various planting campaigns, as seen by studies of sample plots. The planting of spruce has been extensive, because the tract is in a section where spruce has grown native, and it is in the region subsidiary to the great state paper mills. In 1917, for instance, out of 27,000 trees planted, 12,650 were spruce. The statistics show that an average of 93 per cent of those planted are still living. The entire planting of 1915, except less than 1,000 pine, was spruce, 26,000 being planted, and 85 per cent of the spruce are living, with all of the pine. Of the 39,000 trees planted in 1919, 36,000 were spruce, and the percentage living is 84.8, with 100 per cent of the pine.

"This spring's planting was 7,600 white pine, 10,000 scotch pine, 18,950 Norway spruce and 14,500 Norway pine.

"One great value of the keeping of these records will be to ascertain the conditions under which the lowest rate of mortality of the young trees has been attained, and also studies of the rate of growth will be kept from year to year, so that paper companies or private individuals interested in economic planting may be kept informed as to the best methods of securing productive forests. The planting is under all sorts of conditions, favorable and unfavorable, to secure the best information possible as to growing conditions."



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¶ Two 120-inch Yankee Machines, producing Machine Glazed Papers in Plain and Special Stock Designs, as well as Special Watermarks.

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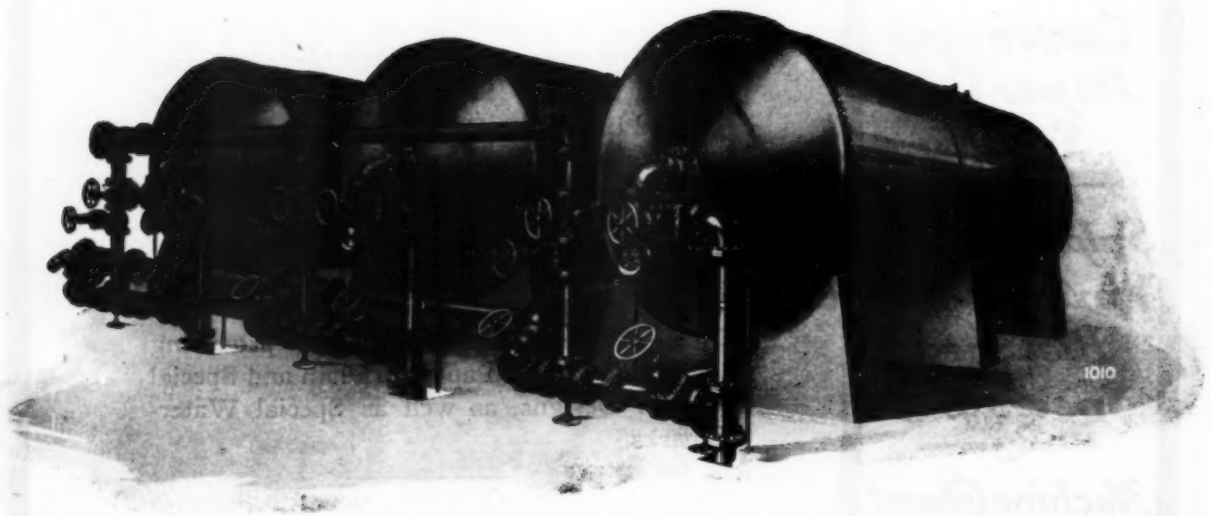
HEADQUARTERS

GRAVER *Filters*



Graver Water Filters will deliver properly clarified water to meet every demand.

Graver Service begins with filling your request for information, extends through the analysis of your water conditions, provides for the proper installation and starting of the correct equipment, and continues throughout the full term use of the equipment.

Write for further information regarding the various types of Graver Filters.

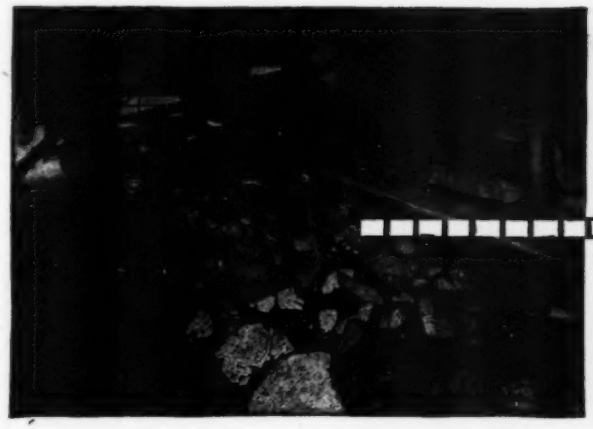
GRAVER *Corporation*

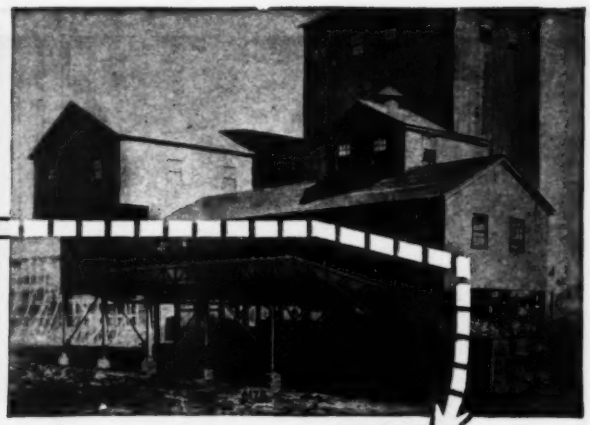
(WM. GRAVER TANK WORKS · FOUNDED 1857)

Steel Tanks and General Steel Plate Construction
Water Softening and Purifying Equipment

7-H

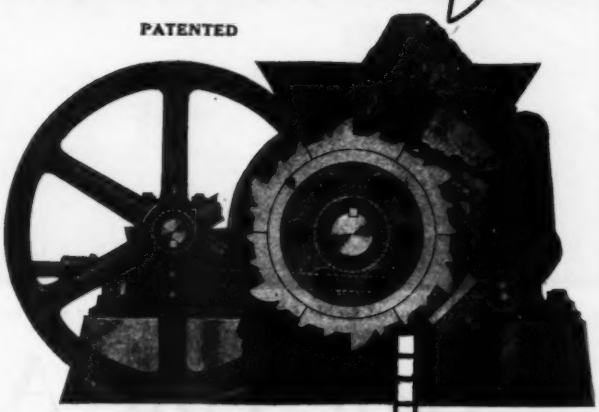
East Chicago, Indiana





PATENTED

Run-of-Mine Coal Through a Jeffrey



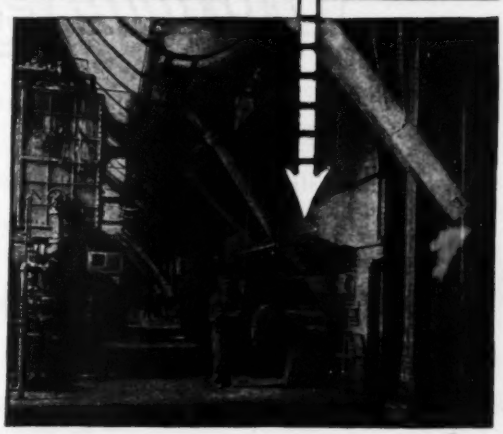
Single Roll Crusher

Will Insure Proper Sizes and Quality of Coal For Your Stokers

Run-of-Mine or Lump Coal give proper quality, but cannot be used in stokers without crushing. Mine Screenings which are of the proper size at times cannot be secured.

The Jeffrey Single Roll Crusher installed at your plant will render it independent of the supply of screenings, and enable you to secure the maximum of stoker efficiency.

Bulletin No. 141-Y should be in the hands of every Manager, Superintendent or Engineer who is responsible for supply properly sized coal. Send for copy.

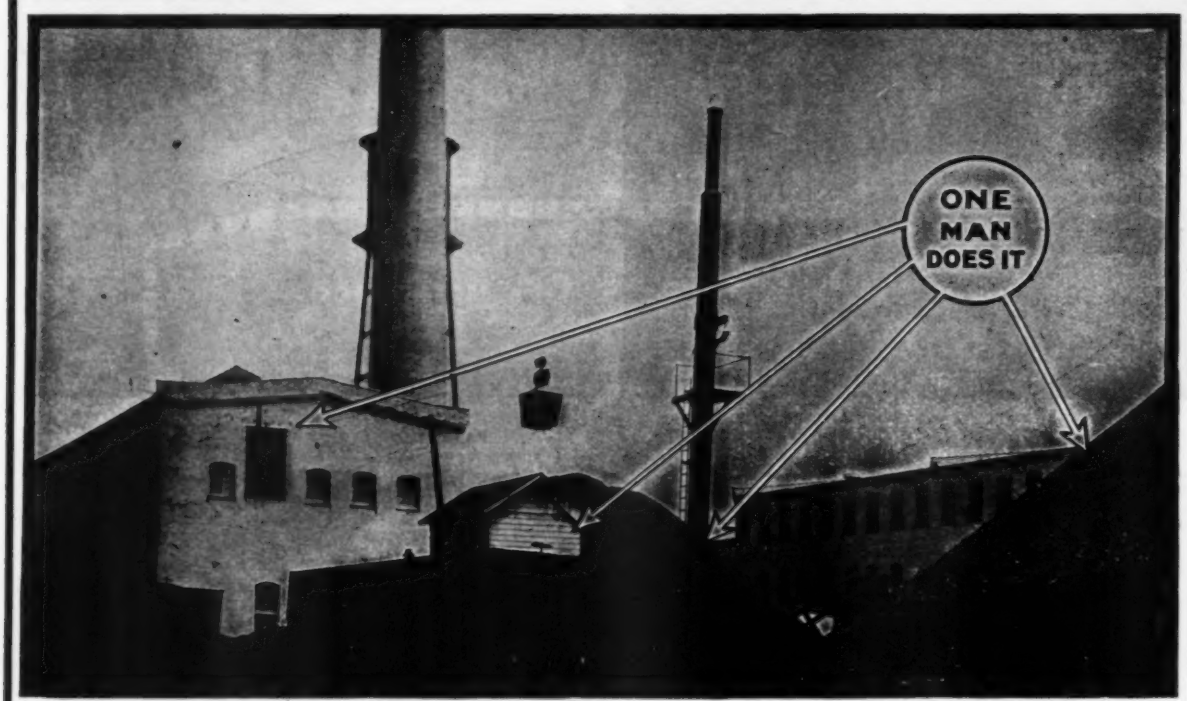


The Jeffrey Mfg. Co.

813 North Fourth St., Columbus, Ohio

BRANCHES:

New York	Charleston, W. Va.	Birmingham
Boston	Chicago	Dallas
Scranton	Buffalo	Montreal
Philadelphia	St. Louis	Detroit
Pittsburgh	Milwaukee	Cleveland
Denver		Los Angeles



Typical Cable-way installation showing coal being carried in bucket direct to boiler room.

Can You Answer Yes
to These Questions?

Are we unloading our coal for less than 7 cents per ton?
Have we been free from demurrage charges?
Have we been free from the high cost and scarcity of labor?
Are we able to unload and store 3 to 5 cars of coal in a day with one man?
If you cannot answer yes to these questions, a

Godfrey System

will answer "yes" for you. **It will add to your profits** and will give you preference in securing cars of coal in areas of car shortage. To get cars is to get coal. Hence the necessity for speed in unloading and the quick release of cars for return to the mine.

The Godfrey System can be adapted to your individual yard requirements.

Write for Literature

GODFREY CONVEYOR COMPANY

119 13th Street ELKHART, IND.

Procure Your Coal Now

ON JULY 31st the Interstate Commerce Commission made public an order authorizing increased rates to railroads. A perusal of the order shows the intention of the commission to meet the recent wage award and also put the railroads on a six per cent income basis, as provided by the Cummins-Esch bill.

This is a step in the right direction. The order has been long overdue, and while everyone who knows anything about the transportation problems in this country and the vital relationship that the railroads bear to the commerce of the country, realizes that the announcement of this increase is opportune, yet he should also realize that the increase has come too late to avert the crisis that will probably occur this coming fall and winter.

For back of the coal shortage and the coal problem lies the railroad problem. It is too late to add the necessary cars; too late to get the locomotives; too late to purchase the tracks and equipment and enlarge the terminals—all needed to relieve the congestion and facilitate the movement of coal this fall and early winter.

Coal is king and coal is going to sit in the king's seat from now until next spring. There is a shortage in the coal supply, not only in this country but the entire world, and although this country's problems will be grave, yet contrasted with the pitiful need in countries like Italy, the Netherlands and other European countries, we are indeed fortunate. For we have the mines at our doors, and it is only our own stupidity and lack of foresight that will deprive us of our coal supplies this coming winter.

However, because we have been stupid and visionless, we have no business to deprive those European countries of coal, who look to us as the only source of supply in the world from which to obtain the coal that alone will keep them alive. We should have no embargoes on the export of coal. At most it will not amount to over one and one-half million tons per month. But there should be some federal regulation by which the exporter may obtain his coal at the ruling price without increasing the price in the domestic market to the basis the exporter is willing to pay. This is a bad feature of the export coal situation. Foreign countries are so anxious to secure even the small amount of coal available that their agents in America are bidding from $4.00 to $5.00 above the market price, and this bidding has a tendency to raise the price of every ton of coal sold to the domestic consumers. This is a bad bit of business, and some way should be found to regulate it, but best authorities believe that the embargo is not the right way.

The usual surpluses of coal in the country are practically exhausted. The great Northwest has no coal supplies for winter. There is no coal on the docks, and the freight trains are moving large quantities of empty box cars west into the grain fields, which in former years have gone out loaded with coal and come back loaded with grain.

We certainly will hear from this situation this winter. Already it has been reluctantly predicted by wise authorities in the coal industry that there is great probability of a federal coal administrator this winter; that industries will be closed down, even those that have coal supplies; that the supplies of coal they have laid in to keep them running will be sent west to keep people from freezing.

This situation could be avoided if all consumers of coal realized the seriousness of the situation and got busy obtaining their coal supply now when it is possible. Every industry and every individual should take any kind of coal that can be found anywhere and not grumble about the price at this late date.

Advise every consumer who has ordered Pocahontas to cancel it and take Illinois or Indiana coal or coal from the mine nearest him.

Everyone should, also, conserve coal. The conservation of fuel this year will constitute not only a great patriotic service, but an economic and industrial benefit. Too much coal is wasted in careless firing, both in households and industries. Therefore, conserve coal. Save every pound possible.

Also discourage all hoarding and hogging of coal. Take your suppy and help the other fellow get his also.

Realize that the miners, the coal operators, the railroads and the wide awake industries are doing everything possible now to produce and forward coal.

Don't let these summer days go by without safeguarding your supply of coal.

The people must have coal to keep from freezing.

The industries must have coal to keep running.

Frozen people and powerless factories produce nothing—nothing except catastrophes.

Pittsburgh Piping & Equipment Co.

Piping Manufacturers and Contractors

Main Office and Plant:
PITTSBURGH, PA.

Foundries:
GREENSBURG, PA.

YOUR NEXT PIPING ORDER

will be filled to your complete satisfaction if you specify

PITTSBURGH PIPING

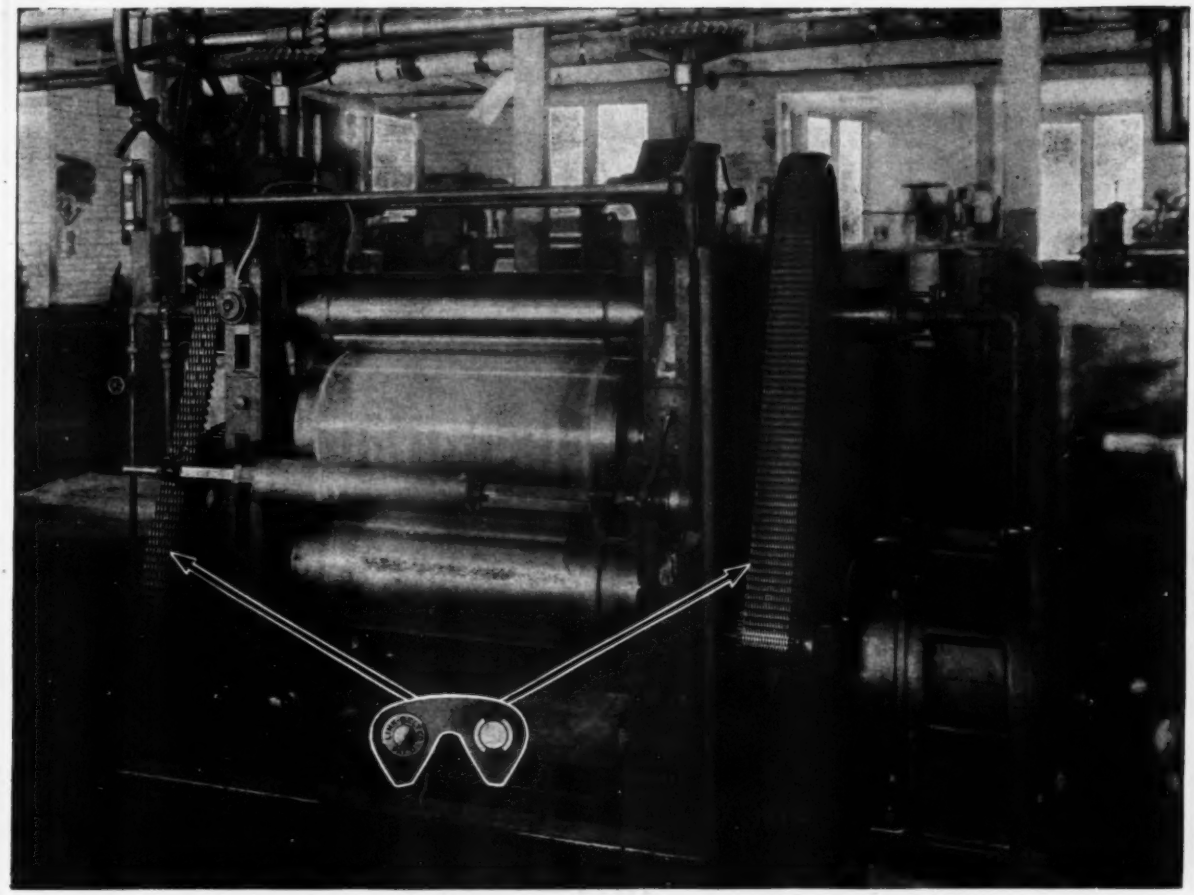
Piping Work of Every Description

Write for "Tables of Piping Standards"—Series 19—if You Are an Executive or Chief Engineer. There Is No Obligation

BRANCH OFFICES

New York	Cleveland	Chicago	San Francisco	Birmingham, Ala.
220 Broadway	Am. Trust Bldg.	Peoples Gas Bldg.	Monadnock Bldg.	Am. Trust Bldg.

WHEN YOU THINK OF PIPING THINK OF PITTSBURGH PIPING



Drive Calenders with Link-Belt Silent Chain

LINK-BELT Silent Chain is the ideal drive for calenders and other machines in paper mills. In the case of the calender, it eliminates gear marks because of its smooth, steady action.

This is due to approximately 50 per cent of the teeth in each wheel always being in perfect working contact with the chain. There are no cut-outs or losses in production as usually caused by the jerky run of gears, due to their one-tooth action.

Link-Belt Silent Chain quickly pays for itself on installations of this kind. It combines in one drive the best points of both belt and gear drives, eliminating their disadvantages. It can be run on short centers at relatively high speeds, in either direction, saves floor space, increases production, reduces journal friction to a minimum and possesses many other advantages which we will be glad to point out to those interested.

Write for Link-Belt Silent Chain price-list data book No. 125.

576-A

PHILADELPHIA CHICAGO LINK-BELT COMPANY INDIANAPOLIS TORONTO

New York 299 Broadway
Boston 9 49 Federal St.
Pittsburgh 1501 Park Bldg.
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Buffalo 947 Ellicott Square
Wilkes-Barre 2nd Nat'l Bank Bldg.
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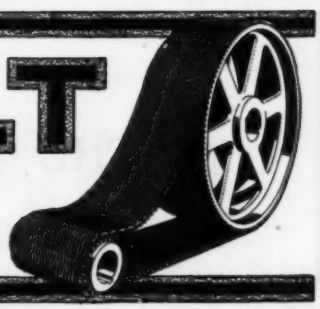
Cleveland 439 Kirby Bldg.
Detroit 700 Woodward Ave.
Minneapolis 418 S. Third St.
Kansas City, Mo. 306 Elmhurst Bldg.
Seattle 576 First Ave. S.
Portland, Ore. First and Stark Sts.
San Francisco 523 Market St.

Los Angeles 163 N. Los Angeles St.
Toronto, Can. Canadian Link-Belt Co., Ltd.
Denver Lindroth, Shubert & Co., Boston Bldg.
Louisville, Ky. Frederick Wehle, Starks Bldg.
New Orleans C. O. Hinz, Hibernia Bank Bldg.
Birmingham, Ala. S. L. Morrow, 720 Brown-Marx Bldg.
Charlotte, N. C. J. S. Cothran, Com'l Bank Bldg.

LINK-BELT
SILENT CHAIN
FOR POWER TRANSMISSION



When He Started To Work That Morning

he was happy and contented. His little home glistened with a fresh coat of paint—the grass and trees were green—the sun shone brightly. He threw out his chest and whistled a gay tune, as he walked along with his free, easy stride.

BUT—

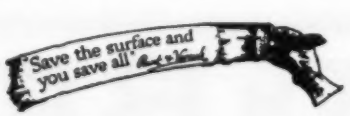
as he neared the dingy factory where he worked his feelings began to change—the whistle died on his lips—the shadow of discontent crept over him. When he reached his work room and looked at the black machinery and the dirty walls and ceilings his happy mood was completely changed. He started his work listlessly and without interest—you can imagine the quantity and quality of his output.

Such a scene takes place every day in thousands of factories. Every industrial plant cannot be situated among trees and flower beds, but every one can be kept well painted both inside and out. Every barrel of paint used means more contented workers. One of our missions in life is to brighten up as many factory buildings as possible with

ELASTIKOTE

which we have manufactured for years for use on buildings in manufacturing districts. Elastikote is made on a different formula—it is not affected by smoke, fumes and gases—it is the ideal paint for factory buildings.

A sample sheet painted with Elastikote will be sent to you on request, so that you can test its elasticity and resistance to smoke, fumes and gases. Also one of our representatives will be glad to call with prices and complete information.

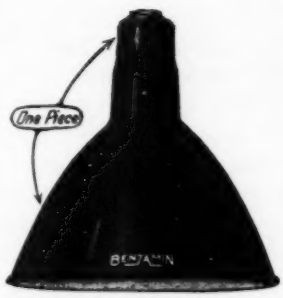


THE TROPICAL PAINT & OIL CO.

CLEVELAND, OHIO

Specialists in the Manufacture of Protective and Decorative Coatings for Industrial Plants

Proper Light Intensity Without Glare



BENJAMIN SEAMLESS DEEP BOWL REFLECTOR SOCKET

—*for Industrial Illumination*

To secure the proper intensity of illumination for certain industrial conditions, it is imperative that special types of reflectors be used.

Deep Bowl Reflectors furnish a maximum re-direction of light. Consequently, they are the reflectors giving the greatest service for the local lighting of benches and machines, or wherever work is done in detail. They are also the most serviceable reflectors for general illumination under high mountings, or where a flat working plane requires illumination of greater than ordinary intensity.

Benjamin Deep Bowl Reflector Sockets are especially designed for known industrial requirements. They are easy to install and are constructed to give long service under the hardest conditions.

The Benjamin Deep Bowl Reflector Socket is of one piece—seamless—porcelain enamel fused upon steel. The enamel is not affected by vapors, heat or moisture and the whole unit is as nearly corrosion proof as lighting apparatus can be made. By virtue of the Benjamin X-Type Fitting and Easy-to-Wire Socket, the lamp and all electrical parts are supported directly by the stem, thus being relieved of all strains which may be put on the reflector.

Benjamin Illumination Engineers will gladly confer with your own architect or contractor on any illumination question you may have.

Address all inquiries to the Advertising Department, 806 W. Washington Blvd., Chicago

BENJAMIN ELECTRIC MFG. CO.

Factories: Chicago and Desplaines, Ill.

Sales and Distribution Offices:

247 W. 17th St., New York 806 W. Washington Blvd., Chicago 580-582 Howard St., San Francisco
Benjamin Electric Mfg. Co. of Canada, Ltd., Toronto, Canada
The Benjamin Electric, Limited, London, England

BENJAMIN
PRODUCTS
The following are divisions of Benjamin products on which we will be glad to send information:
Industrial Lighting Division
Electrical Division (including Benjamin Two-Way Plug)
Pressed Steel Products Division
Enameled Products Division
Starrett Panel Board Division

BENJAMIN

Makers of Things More Useful

SAVE—

Power, Labor, Worry,
Beater Bars, Jordan Filling

MAKE—

A Better Sheet
A Cleaner Sheet
More Paper
More Money

If you want to **save** and **make**, and double your beating capacity without erecting more buildings, and adding more machinery you can do so by adding one or more

Unkle Improved Extractors

Particularly adapted for Board mills or News Print mills, but will effect a great saving in all kinds of mills.

You can **save** and **make**, and learn much to your advantage, as hundreds of other mills are now doing, by writing or wiring

The Griley-Unkle Engineering Co.

General and Sales Offices: Lancaster, Ohio

EDITORIALS

Why Advertise When Behind on Deliveries?

MANY business firms have two times when they do not advertise. One is when orders can be secured without advertising, and the other is when they think there are no orders to be secured. These two conditions exist most of the time, however. Both of these arguments are wrong. The following, taken from the house organ of the Joseph Dixon Crucible Co., tells an interesting story, and is worth reading and studying by other manufacturers:

"This seems to be a very natural question, and the answer involves the discussion of a vital policy of this business—a policy that is fundamental.

"If we were building a business for today our policy would vary from day to day with the temporary changes with which every business has to contend.

"But we are building for the time to come and we hope that this business will become many times greater than it is today. Without the proper foundation it would undergo violent changes dependent upon temporary national, local or even imaginary conditions.

"If we should permit ourselves to become inflated with self-confidence when business conditions are favorable, restricting our selling and advertising activities, and go down in the dumps when conditions are not so favorable, this business would not amount to any more than the existing conditions would make of it.

"We say right now, without reservations, that we hope, regardless of how aggressive and efficient our manufacturing department may be, that it will never be able to catch up with our selling organization.

"If our efforts should be halted in the middle of the road in times of liberal buying to wait on the manufacturing department, there might come a time when the manufacturing department would have to suspend operations while waiting on the sales organization.

"With such a policy we would be running around in a circle, disorganizing one day and reorganizing the next.

"The greater the demand for our product, the quicker the turnover for merchants; and the more frequent the turnovers, the larger is the volume of profit.

"In this business advertising is a sales policy—the same as our policy maintaining a sales organization—and we might as well consider the elimination of one as the other. Neither will be eliminated, as this business needs both if we are building for the future.

"We hope the idea will never creep into this organization that there will be any let-up in aggressive methods, which might suggest that when business is good there is not occasion for work and when business is poor it is too hard to get.

"We constantly have in mind that the American people are much more concerned in their own affairs than in ours, and if we should restrict our selling and advertising activities they will begin to forget us—and this would be our fault.

"We are going ahead with the idea of increasing the present momentum in favor of our goods; and if conditions should turn face about, our dealers and ourselves will be in a better position to hurdle obstacles than if we originated a policy for each condition as it arose."

"But," say some men, "our business is different from others." This is not true unless, as stated, you are only building for today. The only time to advertise, as to do any other big thing, is to do it now, tomorrow, and keep everlastingly at it, and if this is taken proper care of, the rest will be much easier sailing.

Stop the Wanton Waste

By J. KINDLEBERGER

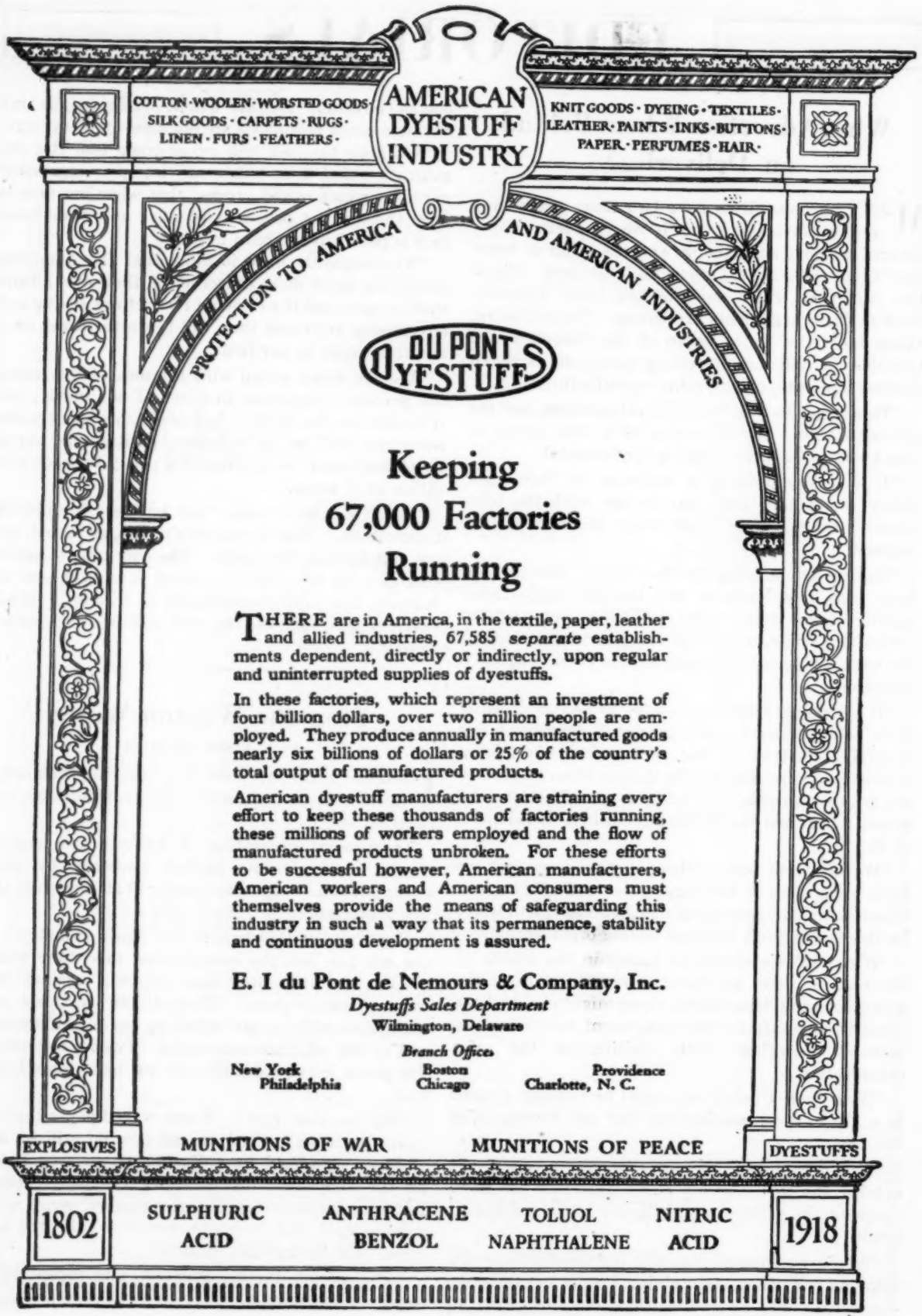
I AM not afraid to make the following statement, but I make it only after due consideration, and observation.

The present generation of America are committing a serious crime against posterity by their thoughtless and enormous waste in all resources and raw materials.

Especially is this true in the paper industry. If the ash pile and the sewers could talk, they would awaken us with their loud protests against this wanton wastefulness. Comfortable fortunes are wasted annually in our mills—by our manufacturers and by the ultimate consumers. Twenty to twenty-five years hence we will wish we had stopped this leak.

Why not start now? Waste waxed paper that for years has been burned up can now be utilized, and is being reclaimed by a Kalamazoo concern known as the Glendale Pulp & Paper Company. Board mills are crying aloud for waste paper, scrap newspapers, etc. But everyone seems to take the attitude, "Let George get excited."

Let's all get excited about it, and repent today before it is too late.


COTTON · WOOLEN · WORSTED GOODS ·
SILK GOODS · CARPETS · RUGS ·
LINEN · FURS · FEATHERS ·
AMERICAN DYESTUFF INDUSTRY
KNIT GOODS · DYEING · TEXTILES ·
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PAPER · PERFUMES · HAIR ·
PROTECTION TO AMERICA AND AMERICAN INDUSTRIES
DU PONT DYESTUFFS
Keeping
67,000 Factories
Running
THERE are in America, in the textile, paper, leather and allied industries, 67,585 separate establishments dependent, directly or indirectly, upon regular and uninterrupted supplies of dyestuffs.
In these factories, which represent an investment of four billion dollars, over two million people are employed. They produce annually in manufactured goods nearly six billions of dollars or 25% of the country's total output of manufactured products.
American dyestuff manufacturers are straining every effort to keep these thousands of factories running, these millions of workers employed and the flow of manufactured products unbroken. For these efforts to be successful however, American manufacturers, American workers and American consumers must themselves provide the means of safeguarding this industry in such a way that its permanence, stability and continuous development is assured.
E. I du Pont de Nemours & Company, Inc.
Dyestuffs Sales Department
Wilmington, Delaware
Branch Offices
New York Boston Providence
Philadelphia Chicago Charlotte, N. C.
EXPLOSIVES
MUNITIONS OF WAR
MUNITIONS OF PEACE
DYESTUFFS
1802
SULPHURIC ACID
ANTHRACENE BENZOL
TOLUOL NAPHTHALENE
NITRIC ACID
1918

We Can Help You Offset Your Shortage of Alum!

AS part of our service we will be glad to suggest to the users of the DeCew Sizing System substitutes and methods which will tend to offset the present acute shortage of alum without impairing the quality of their paper or curtailing production.

Fifty-six paper mills in the United States and Canada are realizing now—more than ever—the many advantages of the

DeCEW SIZING SYSTEM

which actually improves the quality of paper *with the use of less alum and rosin.* The DeCew Sizing System also imparts to the paper a greater resistance to the destructive action of heat and light.

The DeCew Sizing System comprises highly developed Processes and Apparatus, including technical features recently perfected. Back of the System is a Service that includes complete examination of water and stock beating methods, storage conditions and paper machine variables, and necessary adjustment of methods to meet these conditions.

Write for new booklet—*"Patented Efficiency"*

Process Engineers, Inc.

501 Fifth Avenue
NEW YORK

PRODUCTION · ECONOMISTS · ENGINEERS

903 McGill Building
MONTREAL

Where every working minute means money, blown fuses cut profits unless electrical circuits are protected by

ECONOMY *renewable* FUSES

Industries using electrical energy operate more efficiently when delays in machine operation are unnecessary while blown fuses are being replaced.

Economy Fuses are used by thousands of industries because they permit of renewal in minimum time at minimum cost.

Where greater efficiency is required a reserve stock of fuses is kept on hand and used in case of blowouts. The blown fuse then is restored to duty at leisure by simply inserting a new Economy "Drop Out" Renewal Link.

Economy Fuses cut annual fuse maintenance costs 80% as compared to the use of "one-time" fuses.

The fibre cartridge, the winged washers which lock the fuse, and the threaded end caps which complete the assembly are virtually indestructible and are used over and over again.

Economy was the first line using inexpensive bare renewal links for restoring blown fuses to their original efficiency to be *Approved In All Capacities* by the Underwriters Laboratories.

For sale by all leading electrical jobbers and dealers

ECONOMY FUSE & MFG. COMPANY
Chicago - - - U. S. A.

Economy Fuses are also made in Canada at Montreal

Oneida Steel Split Pulley

TRANSMITS POWER AT LOWEST COST

Arms and Hubs Are Interwoven

OVAL CROWN COUNTER SUNK RIVETS

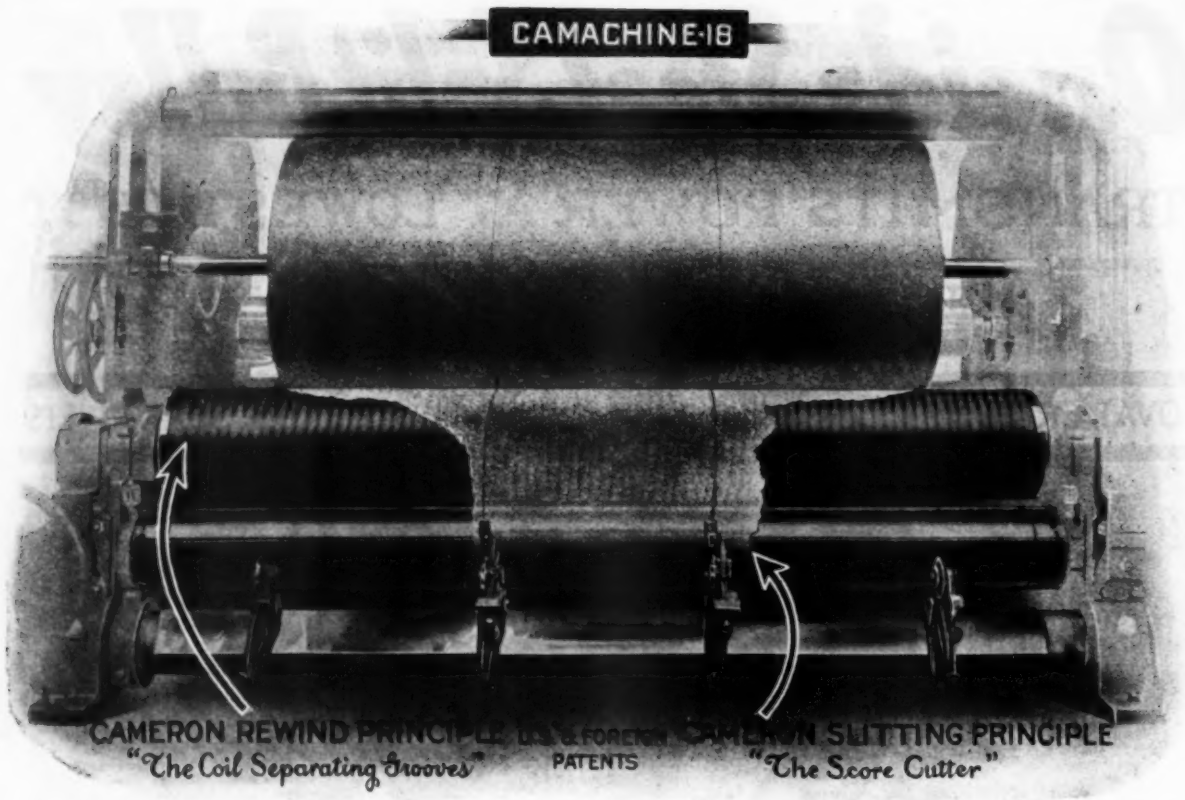
Oneida Steel Pulleys may be run with perfect safety at any speed at which it is practicable to operate a belt. The fish-plate arm to rim connection makes it a "safety first" pulley in every sense.

The arms, as well as the hubs, of the Oneida are made in two pieces. They are interwoven into the flanges of the hub and securely riveted into place. The perfect oval crown insures the greatest possible belt grip or adhesion. Transmits maximum power at minimum expense of belt pull or tension. Loose belts mean less bearing friction and saving of belts. Order Oneida pulleys from your dealer.

DODGE

Dodge Sales & Engineering Company, distributor of the products of the Dodge Manufacturing Company and the Dodge Steel Pulley Corporation. General Offices: Mishawaka, Ind. Works: Mishawaka, Ind., and Oneida, N. Y.
Canadian Plant: Dodge Mfg. Co. of Canada Ltd., Toronto and Montreal

Philadelphia Cincinnati New York Chicago St. Louis Boston Atlanta Pittsburgh Minneapolis Dallas Providence Seattle Newark



Heavy Duty Paper Mill Rewinder

CAMACHINE—18

24 Years of Slitting Experience Is Built Into CAMACHINE-18 PLUS EXCLUSIVE PATENT RIGHTS

Note the New Feature of Cameron Rewinding Principle—the Coil Separating Grooves

For complete data address the PATENTEES and BUILDERS

CAMERON MACHINE COMPANY

BROOKLYN NEW YORK
U. S. A.

Cramped for floor Space in Your Beater Room?

Here's a profitable way to not only make your present floor space go twice as far—but at the same time reduce your power consumption 50%—*and still keep up production.*

Install a Bird Continuous Beater Attachment

It pays for itself six times over the first year. Keeps stock uniform. Saves time and labor. Removes strings and rags from board stock. Together with one ordinary beater it accomplishes as much work as two beaters. It is a simple, practical and effective device, designed to be attached to any ordinary tub.

Let us send you our "Continuous Beating Catalog F."

BIRD MACHINE COMPANY
EAST WALPOLE, MASS.

Western Representative:
T. H. Savery, Jr., 1718 Republic Bldg., Chicago, Ill.
Canadian Builders of Bird Machinery:
Canadian Ingersoll-Rand Co., Ltd., 260 St. James Street, Montreal, Can.

Continuous Beating

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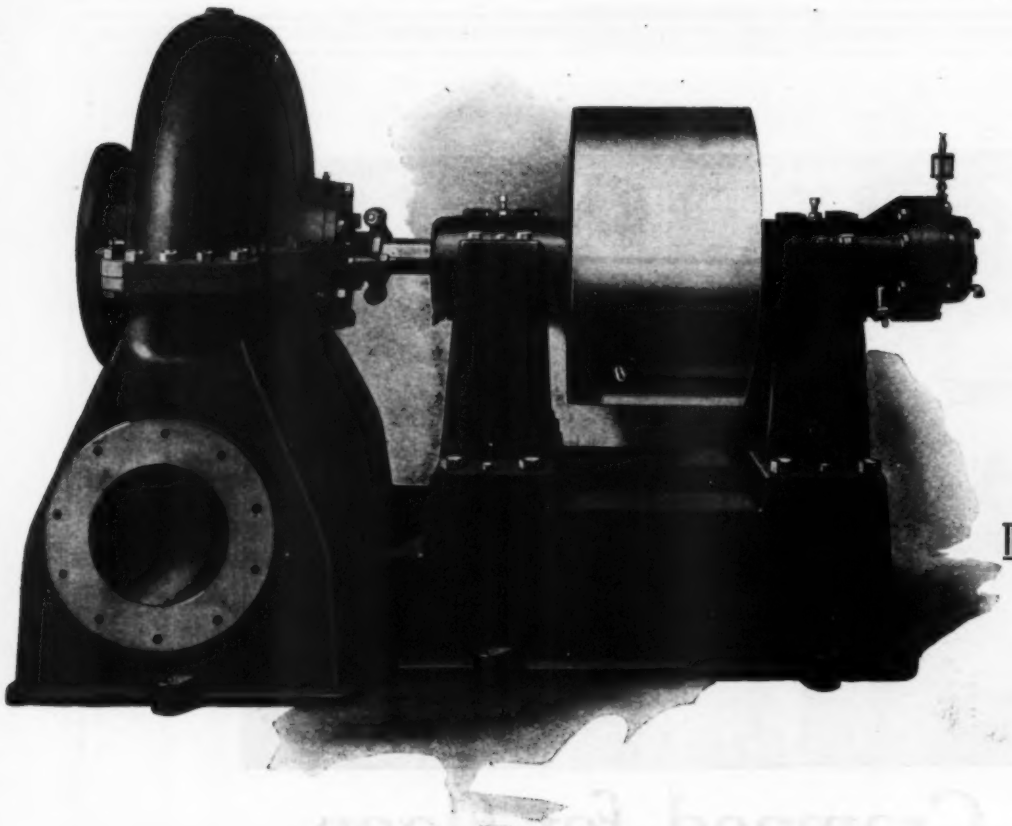

Buffalo Divided Shell Paper Stock Pumps

For Handling Paper Stock up to 4%

THE casing is divided horizontally, allowing upper half to be easily removed for inspection of working parts. It is not necessary to break pipe connections—simply remove bolts in upper half of suction flange.

Discharge opening can be furnished at an angle of 45 degrees up from horizontal if desired. Stuffing boxes are split and water cooled greatly prolonging life of packing.

Can be furnished with either the standard Buffalo enclosed type paper stock impeller-or with open impeller.

Write for Bulletin 953-27.

Buffalo Steam Pump Co. Buffalo, N. Y.

Manufacturers of Steam, Power and Centrifugal Pumps and Condensers.

New York
Boston
Philadelphia
Pittsburgh
Cleveland
Detroit
Chicago
St. Louis
Los Angeles
New Orleans
Atlanta
Minneapolis
Denver
Salt Lake City

250 Years of Service at Versailles, France
410 Years of Service at Weilburg
165 Years of Service at Claremont, Ferrand
120 Years of Service at Glasgow and London

Service Measured by Centuries

Let Time be Your Teacher

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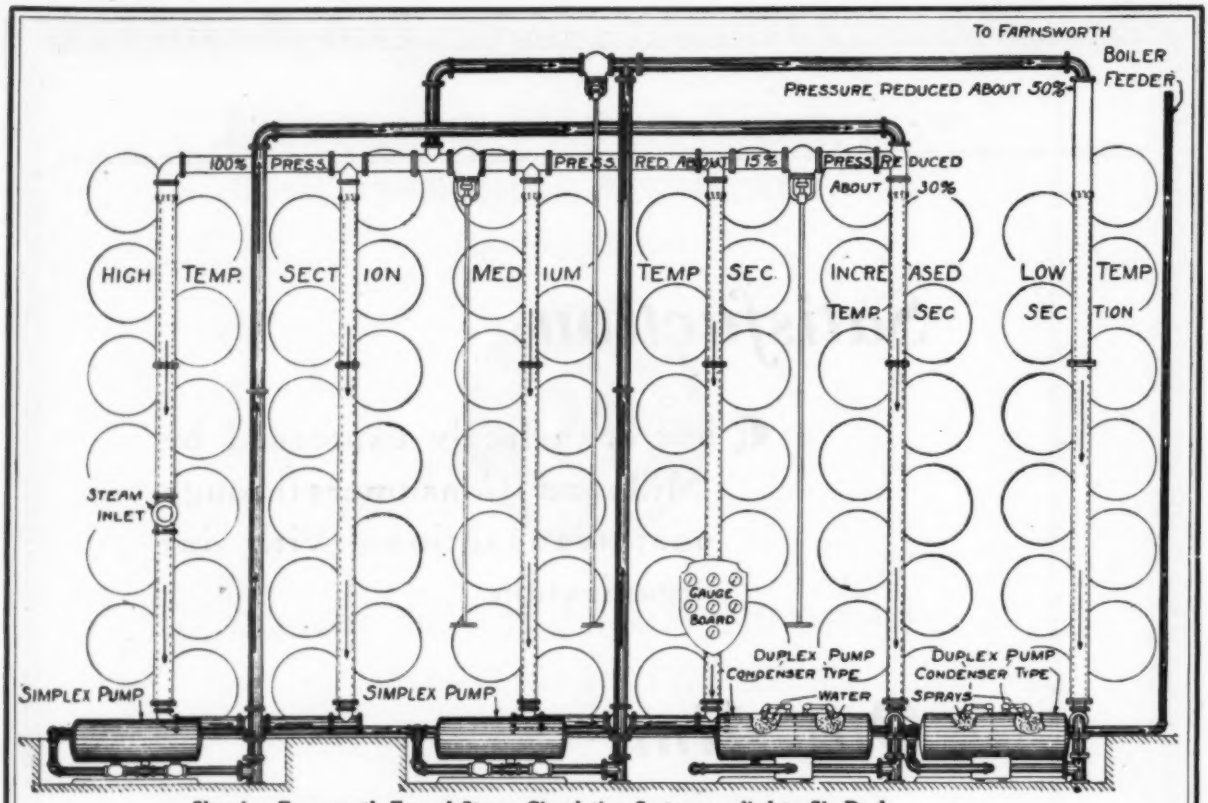

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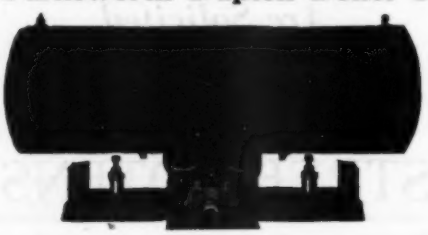

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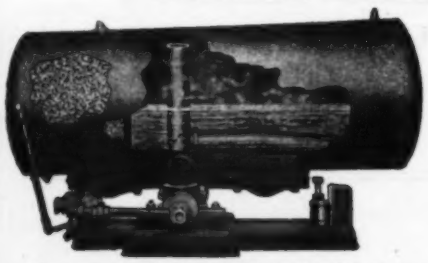

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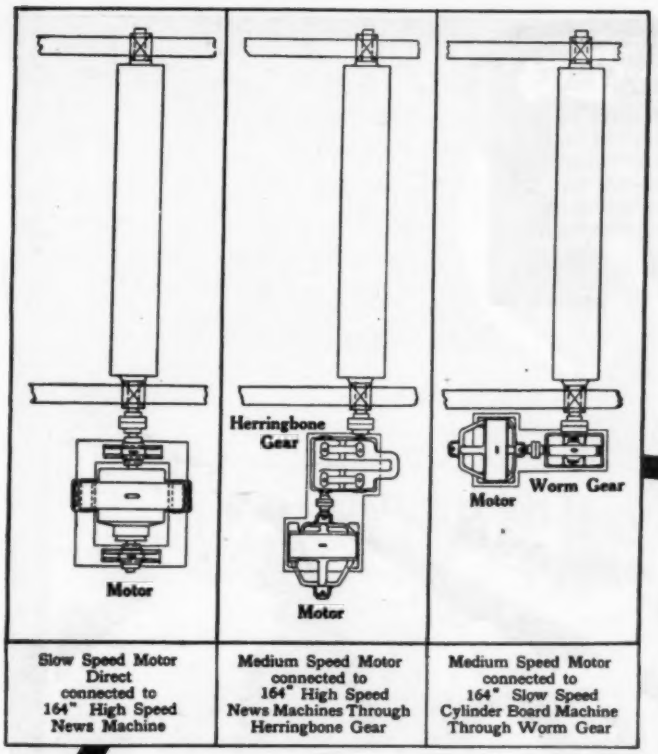

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Progress Report on the Study of Wood and Wood Pulp Infection and Decay

By OTTO KRESS and C. J. HUMPHREY
U. S. Forest Products Laboratory, Madison, Wisconsin

IN OCTOBER of last year, a report* on the deterioration of wood and wood pulp was published in response to requests from various mills for information on this subject. Since that time, as no Federal funds for the study of the problem were available, some of the interested mills have contributed funds to enable us to continue the investigation so that at the present time the laboratory has taken on two additional pathologists and two chemists. The laboratory is furnishing additional help and bearing part of the expenses of the study.

During the past six weeks, the writers have visited about eighteen of the co-operating mills in order to secure data and photographs relative to present practices and losses entailed both in the storage of pulp and pulp logs.

At the present time, comparatively little ground wood is being stored, so this phase of the problem is of far less importance than the storage of the wood. Losses from decay in the wood pile at many mills are staggering, the amount of deterioration depending on the method of piling, age of the wood and sanitary condition of the yard.

Broadly speaking there are two general types of storage: 1, in the yard, either in ricks or in large ically ideal, as no decay can take place when wood is unloaded into the river. It is believed that with certain modifications yard storage is preferable. Water storage by complete submersion is theoretically ideal, as no decay can take place when wood is in a saturated condition; however, under present commercial practices this condition does not hold, for a large part of the logs are floating, with the exposed portion often dried out sufficiently for decay to take place. In addition to this, the logs are often jammed or left exposed on the banks at low water; also, when unloaded from cars into the river high piles are built up extending out into the water and the greater portion of this wood is exposed under very favorable conditions for decay, particularly in a zone just above the water line.

As between ricking wood and dumping it from conveyors into large conical piles, the consensus of opinion appears to be in favor of the ricks, provided these ricks are separated from each other by continuous air passages at least 3 feet wide to allow for uninterrupted circulation of air.

In general, present wood storage conditions at the mills are deplorable, and too much emphasis can not be laid on the necessity for reforming present practices.

Many of the yards are practically littered with rotten or infected woody or bark debris, which serves as a source of infection for new wood and hence should be removed and burned. A considerable number of yards are on low ground which should be filled with dirt, surfaced with cinders, to secure necessary drainage and keep down weeds and grass which impede the circulation of air around the base of the piles.

Likewise, good sound foundations for ricked wood which are well off the ground are conspicuous for their absence. Not a single mill was properly equipped in this respect. Present practice consists either in piling directly upon the ground or on pulp logs laid lengthwise of the piles and often pressed deeply into the soil.

These conditions must be corrected before the mills can hope to control the decay problem. A summary of points to be observed as far as possible in modifying present practices is as follows:

1. Ship pulp logs as soon as possible after cutting to avoid their lying in the woods where high moisture content and growing vegetation tend to cause infection and decay.
2. Peel logs if possible, as this prevents borers from attacking the wood, and also hastens air drying, thus tending to prevent decay.
3. Remove decaying wood from the yard to eliminate the source of infection for new wood.
4. Drain and care for storage yards so as to reduce the soil moisture as far as possible; cut weeds to allow for better ventilation.
5. Fill in yards with cinders; this gives good drainage and keeps down weeds.
6. On removal of a pile of wood, clean up bark and burn skids if they are badly infected. Under all circumstances, infected skid logs should be removed. The yard should never be placed on ground filled in with barker waste.
7. Do not rick wood directly on the ground. The best procedure is to put in concrete piers supporting stringers, which have been given a pressure treatment with coal tar creosote, on which to pile the logs. Such stringers should not be brush treated but should be pressure treated and will last at least twenty years. In case it is not considered feasible to equip the yard with concrete piers, the next best practice would be to use wood blocking pressure

*Some Observations on the Deterioration of Wood and Wood Pulp by Otto Kress, C. J. Humphrey and C. Audrey Richards. The Paper Industry, October, 1919.

treated with creosote as supports for the stringers. In any case, the stringers should be at least 12 inches, and preferably 18 inches, off the ground so as to allow for ample ventilation from the sides.

8. Mark each log pile as it is received with date at which it was piled, and if possible, age of the wood. Use up wood in rotation. If ground in the yard is available, pile so that the full length of the pile is exposed to the prevailing wind. Never place two piles with less than a three to four-foot space between the piles.

9. Where timber is placed in conical piles by the use of conveyors, a possible remedy may be to keep the wood saturated with water by means of an overhead sprinkler system. This is based on the fact that wood saturated with water will not rot because there is not sufficient air within the timber to allow the fungi to grow. Whether it is commercially possible to wet the piles down sufficiently and maintain them in this condition must, however, be demonstrated by actual test. If effective, the mills will have accomplished two objects; namely, protection against both fire and rot. It is our understanding that certain of the mills are trying out this scheme mainly on the recommendation of Mr. F. J. Hoxie of the Factory Mutual Fire Insurance Companies of Boston.

Fundamental laboratory studies are also under way to determine the moisture limits at which wood-destroying fungi will rot the timber. The results of these tests will indicate just how wet the timber must be kept to check decay.

Study of Infection and Deterioration of Ground Wood Pulp and Possible Means for Overcoming the Same

When this investigation was undertaken, it was understood that the study of the causes and possible prevention of infection and decay of ground wood pulp was of primary importance, but, from observations, it appears to us that the prevention of further decay in pulp wood as received at the mill is of greater importance from a monetary consideration. While the mills are receiving and will continue to receive infected wood, certain changes in storing, and using the piles in rotation will tend to minimize the loss from decay.

Up to the present, this problem has been attacked mainly along the lines of preventing the development of molds, bacteria and wood-destroying fungi in stored ground wood and sulphite pulp by the addition of antiseptics to the wet laps either on the wet machine or after removal from it. The method consists in applying the antiseptic solutions in the form of a fine spray by means of an ordinary garden sprayer working by compressed air. Altogether over 5,000 laps of ground wood pulp, approximately 12 inches by 24 inches, and 1,000 laps of sulphite pulp have been thus treated with varying concentrations of 105 different chemicals of possible antiseptic value.

After applying the spray, part of the laps were inoculated with a mixture of a large number of molds previously isolated from badly infected pulp, and the remainder with several species of wood-destroying fungi likewise secured from decayed pulp. The laps were then stored in close piles in a special shed in which both the temperature and atmospheric moisture are held at a point favorable for the development of the organisms.

Inspections are made every six weeks to two months and the condition of the treated laps noted, as compared with untreated pulp stored in the same piles.

Records are taken of the moisture content of both the treated and untreated laps, as well as the amount of antiseptic solution applied, so that after the early inspections reveal which antiseptics are the most efficient, the experiment can be repeated, using weaker solutions and thus cutting down the cost of treatment within commercial limits.

At the present time, the two oldest series of these tests have been running ten and eleven months, respectively. Eleven of the antiseptics in the first series proved highly effective; only two were satisfactory in the second.

These have for the most part been repeated both in the original and reduced concentrations so as to obtain a further check on their efficiency.

Recently one of the co-operating mills has sent to the Madison Laboratory about three tons of rotten ground wood pulp which will be used as a source of further infection for the treated laps which have stood up against previous tests. These laps will be inserted in a large pile of the decayed material, and thus given as severe a test as it is possible to devise.

The following remedies are suggested to prevent decay of wood pulp during storage:

1. Proper rotation of the piles of pulp, storing if necessary in several smaller piles in order that the oldest pulp will be used up first.

2. The use of antiseptics applied probably in the form of a fine spray on the wet machine, provided that the laboratory trials develop a successful and fairly cheap method of treatment.

3. Storage of pulp on concrete floors, avoiding contact of the pulp with the ground or with planks that may have become badly infected from previous pulp. Concrete floors should be provided with proper drainage and after complete removal of the pile should be hosed off, the drain capped, and the floor sprayed with an effective antiseptic as an additional precaution.

4. Avoiding piling of fresh pulp on old pulp, as this spreads the disease in case the older pulp is infected.

5. Removal of badly infected pulp, burning same if too badly decayed for use in paper making, also

burning planks, skids and other infected debris in the neighborhood of the pulp pile.

6. Keeping down weeds near the pile and filling the surrounding area with cinders to assist in proper draining of the ground.

Paper Making Tests on Decayed Groundwood and Infected Sulphite Pulps

In a previous paper by Kress, Humphrey and Richards (loc. cit.), the authors described the results of infection of ground wood pulp in the course of which paper machine runs were made on clean and infected pulp, and the resulting papers compared for strength, color, freeness from dirt, etc. In general, it was found that the infected ground wood of a condition similar to the shipment received at the laboratory, had the following drawbacks in comparison with clean pulp made from similar wood and under similar conditions:

1. Decided decrease in fibre length, so affecting the yield, felting quality of the stock, strength of the finished paper, and slowness of the stock.

2. Too great freeness of infected pulp. While ground wood pulp is often considered too slow, the extreme freeness of the infected pulp would offer difficulty in carrying the necessary water on the paper machine and in securing a good formation in the finished paper.

3. Infected pulp is very much darker, thereby dulling either white or colored sheets in which it is used.

4. The yield of finished paper based on the percentage of ground wood used is decreased approximately 10 per cent.

5. The strength of the finished paper is decidedly reduced. In a ground wood-sulphite furnish, this decrease in strength would necessitate the use of a larger percentage of the more expensive sulphite pulp in the furnish.

6. Infected pulp on the paper machine offers difficulty in sticking to the couch and press rolls and in excessive foaming.

7. Infected pulp will require more sizing.

8. Infected pulp will make a very dirty sheet.

The sound and infected ground wood were examined chemically,* the indication being that infection had reduced the percentage of cellulose and increased the percentage of water soluble material. A great deal of further work will be done on the study of the chemical changes which take place in the cellulose and non-cellulose material during the processes of decay in wood and wood pulp.

While sulphite pulp is normally not stored for a sufficient length of time to deteriorate, there is no question that infection will occur, provided the pulp is stored under unfavorable conditions. Sulphite pulp, even though it is prepared from badly infected wood is undoubtedly sterilized during the digestion of the wood, but later, during piling, may become infected.

The laboratory was furnished, through the courtesy of one of the Wisconsin mills with sufficient infected, unbleached, hemlock sulphite pulp to enable us to make a pathological investigation of the organisms causing the decay as well as of the deterioration in the strength of the pulp.

TABLE I.—STRENGTH TESTS ON INFECTED, UNBLEACHED, COMMERCIAL HEMLOCK SULPHITE PULP IN COMPARISON WITH SOUND HEMLOCK SULPHITE PULP.

	Weight 24x36/ 500 basis	Points per pound	Breaking length meters	Folds No.	Percent stretch	Temperature of	Humidity %	Yield pulp %	Screenings %
Infected, unbleached, commercial hemlock sulphite pulp—cooked Aug., 1919, run No. 1	31.0	.34	3820	8	1.6	70	64	...	...
Infected, unbleached, commercial hemlock sulphite pulp—cooked Nov. 15, 1919, run No. 2	34.0	.56	5080	63	2.14	71	65	...	...
Sound, unbleached hemlock pulp—cooked at the laboratory—sulphite cooks—cook 350	46.5	.69	6550	623	3.40	77	65	45.3	0.10
Sound, unbleached hemlock pulp—cooked at the laboratory—sulphite cooks—cook 355	48.1	.84	6130	719	2.96	75	64	45.6	0.20

Table I gives the strength data on two lots of this pulp in comparison with hemlock sulphite cooked at the laboratory from sound wood. The pulps were in all cases given as nearly identical beater treatments as possible and run over the experimental Fourdrinier paper machine under similar conditions. The papers represent waterleaf sheets, not being sized or alumed, in order to obtain more accurate strength comparisons. The infected hemlock sulphite pulp is decidedly weaker than pulp made at the laboratory from sound wood, the decrease in strength being most notable in the folding strength, which for the lots of infected pulp average 8 and 63 double folds, respectively, against 650 double folds for the sound pulp.

Comparative Pulping Tests on Infected and Sound Wood

Through the courtesy of the same mill that furnished us with the infected sulphite pulp, a shipment of infected hemlock logs was received, which from specific gravity or weight per cubic foot, determinations showed that for each 100 cubic feet of solid wood this infected wood was shy from 300 lbs. to 600 lbs. of wood substance, in comparison with the corresponding weight of an equal volume of sound wood, the wood in each case being calculated to a bone dry basis. If it is considered that with Wisconsin pulp woods such as spruce, hemlock, and balsam, the yield of pulp is directly proportional to the specific gravity of weight per cubic foot of the wood, a variation of from 300 lbs. to 600 lbs. of

*A Chemical Investigation of Sound and Infected Ground Wood Pulp—By S. A. Mahood and D. E. Cable—Paper, Vol. 25, No. 24.

wood substance per 100 cubic feet of solid wood indicates at once the tremendous loss occurring to the mill due to such infection. Further, the mills purchase their wood on the cord or volume basis, but sell pulp or paper on a weight basis, which accounts for the low yields per cord obtained at most of the mills.

The recent visit of the writers to eighteen of the co-operating mills leads to the belief that much of the wood over one and one-half years to two years old is sufficiently decayed to cause an average loss to the mills of 300 lbs. of wood substance per 100 solid cubic feet of wood.

Cooks on the above shipment of infected hemlock were made at the laboratory by the sulphite and soda processes of pulping, and the pulps put over an experimental paper machine. The resulting papers were weaker than that made from sound wood.

Similar pulping trials were made on a shipment of infected and sound aspen wood upon which specific gravity or weight per cubic foot determinations showed an average loss of wood substance of 300 lbs. per 100 solid cubic feet of wood. The results indicated a weakened pulp on which the yield on a weight basis is practically the same for both sound and infected wood, although a larger volume or cordage of infected wood is required per ton of pulp than with sound wood.

A mill run on the grinding of sound and infected spruce wood, which we were enabled to make through the courtesy of one of the co-operating mills, has just been completed, showing a loss of 390 pounds of bone dry pulp per cord of barked infected wood as compared with sound. Considerable further work will be done on the pulping of infected wood and study of the resulting pulps.

The writers have been fortunate in finding decayed wood at four mills, each lot of which represents infection from practically only one organism, and through the courtesy of these co-operating mills, some of this wood has been shipped to the laboratory for pulping and pathological study.

The lumber industry, in view of the higher price they can afford to pay for sound wood, will continue to receive the best timber suitable for cutting into lumber, while the paper industry must be satisfied with, in part, inferior wood. This means that the mills will receive partly infected and decayed wood, but by proper sanitation of the wood yard and rotation of the wood, a great deal of the decay and loss of wood can be prevented.

Further, while the seller and buyer agree as to the proper scaling of the wood and the allowance to be made for the rot in the wood, we feel that such allowance is not fair to the paper mills. Trials now being made by the laboratory at various pulp mills strongly indicate that purchasing wood on the present cord basis and scaling for the percentage of rot is only an approximation of the volume of sound wood that is bought by the mill. In these trials which were started approximately six weeks ago, the wood is scaled, weighed and sampled for moisture preliminary to chipping or grinding, and results indicate that the only accurate and fair way of purchasing wood is on a weight basis.

There is no question but that closer attention to the condition and character of the wood as it is bought, as well as better means of storage, would mean a decided saving to the mills.

Intelligence?

If we had been taught
To think with our feet,
Where do you think
We would think?

If we had been taught
That the water was air,
What do you think
We would drink?

If we had been taught
To breathe through our knows,
That this breath was Life,
And the body mere clothes;

That breast was the bloom
Of Spirit divine
Unbosomed in man
To inspire, refine;

That blood was the current
Of infinite essence
Unfolding the grace
Of Love by its presence,

And what would we do
All the live-long day?
What would we think,
And what would we say?

How should we cherish
This current of Mind
Which flows through the heart
As the grape gives wine?

Would we cease to feast
On imagined lore?
Would we stand by the Truth
And love good more?

Would we find Him the substance
Of blood, breath and air;
Abide in His tenderness
Rest in His Care?

When shall we 'wake,
And when shall we act;
Have done with fiction
And know but the fact?

—Written for The Paper Industry by R. L. S.

Machine and Beater Room Organization

Who Handles Your Jordan Engines?

THERE is a considerable difference of opinion on the subject of whether the Jordan engine should be operated by or under the supervision of the machine tender, or should the beater engineer have full responsibility for the grade of stuff which is put onto the machine.

At the request of a large New England paper manufacturer, a canvass has been made of some of the larger mills in the mid-west states and Canada, and an expression obtained from them on their methods of handling the operation of these engines, and their reasons for it. There is one point on which all mills agree, and that is that the highest co-operation between the machine tender and the beater engineer must necessarily exist at all times in order to obtain any results whatever, since one can make a lot of trouble for the other, should there be any friction between them.

An amusing story is told of the manner in which Ponto Myers, when a machine tender some years ago at the Bryant Paper Company, frequently complained about the kind of stock the beater man was giving him. Not possessing a strong, clear voice, he had difficulty at times in making himself heard; becoming exasperated over some trouble he was having on the machine, he would put his hand to his mouth and wheeze in the boss's ear, "What the h—l do they think this is—a grist mill? The stuff they're giving me is just like flour."

Under Supervision of Machine Tender

Mr. O. Bache-Wiig, vice-president and general manager of the Wausau Sulphate Fibre Company, Mosinee, Wis., says: "In our mill the beater engineer has charge of the Jordan engines, but naturally he is in close touch with the machine tender at all times.

"As you probably know, in the manufacture of kraft paper it is very important how the stock is treated, as the strength will vary according to the treatment. We believe, however, that it would be putting too much work onto the machine tender if he should have the handling of the Jordans himself, and as the beater engineer has much more time on his hands than a machine tender, we think the best method is to have it arranged so that the beater engineer will take orders from the machine tender as to the changing of the stock."

The beater engineer of the Patent Vulcanite Roofing Company, Anderson, Indiana, believes "It is by far most advantageous to have Jordans in mills making roofing papers in the machine room, because the machine tender knows just the length of fiber he wants for the particular kind and quality of paper he is running, and can therefore regulate the Jordans himself to the greatest advantage.

"It is not infrequent that I go into the machine room to find out from the machine room tender if the stock is okay or too long, or too short. This would be a saving on my time, as I am quite busy at all times controlling and supervising the operation of the beaters.

"We have half of our Jordans in the beater room, and the other half in the machine room, but the machine room tender has told me that he would much prefer to have them all on his side."

The Nekoosa-Edwards Paper Company operate two mills, one at Nekoosa, Wis., with four paper machines, and the other at Port Edwards, Wis., with two machines. They manufacture manilas and fibre papers. C. A. Wiley, superintendent of the Nekoosa mill, says: "Our Jordans are handled by the beaterman, through the orders from the machine tender. We have so many different grades and weights, the beaterman could not look after the Jordans alone, and always have the stuff right. When I ran a machine, I always wanted to handle my own Jordan."

O. L. LeRoux, superintendent of the Port Edwards mill, says: "My Jordans are handled by the beater engineer under the instructions of the machine tenders. Both men work together as to their judgment of how the machine runs and appearance of the sheet of paper.

"In regard to my ideas of handling the Jordan, I believe that when the Jordans are in the beater room, it is much better for the beater engineer to handle same; but if the Jordans were in the machine room, as they are in some places, I would be in favor then of having the machine tender handle them."

Charles Chapman, superintendent of the Marion Paper Company, Marion, Ind., manufacturers of container liner and folding box board, says the following in regard to beater room practice: "It is deemed most advisable in the majority of cases to have the Jordans installed in the beater room. First, it brings the machine room man into the beater room more frequently to see just what kind of stock is going into the beaters, and while there, can gauge his stock by the Jordans accordingly. In the meantime, there are always responsible men to take care of the supervision of the paper machine during his absence. Second, raw stock is much poorer than it used to be, and needs very careful attention to keep out paraffin papers, cemented cartons, and other foreign products undesirable in test board, which proves very poor upon making a test upon a product

of this kind. The beater room man, as a rule, will not watch for this foreign matter as close as the man who is directly responsible for the test, or the machine tender.

"The machine tender should have something to say and exercise his own judgment and discretion as to operations in the beater rom."

In the manufacture of book and catalog papers, Mr. Alfred Bryant, superintendent of the Milham Division, Bryant Paper Company, Kalamazoo, Mich., says: "Our beater engineer operates the Jordan under the direction of the machine tender. Our reason for this is that we believe the machine tender should know what kind of stuff is necessary to make a good sheet. It is his duty to tell the beater engineer what he wants."

W. C. Ziemann, general superintendent, Abitibi Power and Paper Company, Ltd., Iroquois Falls, Ontario, says: "As a paper-maker of long experience, I have always used a Jordan up till the last few years, when we stopped using them on newsprint.

"When I did use them, I always found it the best practice to leave them in the hands of the beater man to operate under the instructions of the boss machine tender, as he is the man who has to judge when the Jordan needs changing. The reason for this is that the boss machine tender is always on the alert for a change in stock, while the beater men are not so much interested as the men actually making the paper.

"We very seldom use the Jordan on newsprint, as we make the stock to suit the machine in the grinder room."

Believes Beater Man Should Operate

Quite contrary to the aforesaid opinions regarding this subject, Mr. Charles G. Oberley, general manager of the Munising Paper Company, Munising, Michigan, manufacturers of bonds, offset, waxing papers and sulphite fibre papers, says, "In my opinion, the best man to handle the Jordan is the one who has the greatest knowledge of suitable stock for making paper, and he is the beater engineer, and not the machine tender. I have seen considerable trouble occur where the machine tender had a number of breaks from some cause other than the stock, and he would complain to the beater engineer that the stock was too short, and try to persuade him to pull off the Jordan until the stock was long, with the hope that it would stop the breaking on the machine. Later on he would probably find the trouble on the machine and remedy it, thus stopping the breaking, and when the stock he had ordered the beater engineer to give him came into the machine, it was so long that nothing could be done with it. My idea is that the beater engineer should have strict orders from his superintendent not to take any orders from a machine tender, as when you have the right man for an engineer, he is able to tell whether the stock is right for the machine or not. I think if all the mills would keep the machine tender away from the Jordan engine, they would have better and more uniform paper."

This is in substance the same opinion as voiced by Mr. J. Kindleberger, president and general manager of the Kalamazoo Vegetable Parchment Company, who was a machine tender himself in his early career and consequently knows their tendency to hold the Jordan accountable for all machine troubles. "Many machine tenders," he says, "have only a one-track mind and instead of analyzing their difficulties to see whether or not the machine is to blame, they fall back on the cure-all remedy and change the stock."

Ernest Rossiter, assistant manager, Brompton Pulp and Paper Company, Ltd., East Angus, Quebec, says, "Our policy here is to leave the machine tender free to watch his machine. The beater-room stock runner for the news mill handles the news mill Jordans; the beater engineer handles the kraft paper mill Jordans.

"As a general principle, it is advisable to confine the machine tender's work to running the machine only, the boss machine tender is in charge of the beater room operation, and if any Jordan changes are to be made, he is the one responsible."

At one of the mills in Michigan, making raw stock for coated papers and light weight specialties, the beater man working with the machine tender is held responsible for the sheet test and consequently has full charge of all the beaters and Jordans. "Our reason," says the superintendent, "is that we believe the machine tender has all he can do to operate his machine."

This same method is used by Mr. Gilman, superintendent of the Bryant Division, Bryant Paper Company, making book and light weight catalog papers, who said that one reason for it is that it avoids trouble between the machine tender and the beater engineer. Mr. Gilman said that he requires every machine tender working night and day to tear off a sample from each roll, mark the roll number on it, and place it on his desk each day. He personally tests them all for weight.

A prominent writing paper mill in Michigan making high grade bonds and ledgers has the beater man handle the Jordans and holds him responsible for the stock.

This is also the method employed in the King Paper Company manufacturers of book, coated and offset papers, and the Standard Paper Company, makers of news, filled news and chip boards, both of Kalamazoo, Michigan.

Operated by Machine Tender

H. C. Evans, manager, Alton Box Board and Paper Company, Alton, Illinois, makers of paper stock board and straw board, says, "Our machine room gang handles the Jordan engines, and our reason for

doing so is because we feel that in the manufacture of our grade of stock, the way that we handle it, the machine tender knows more what he wants than the beaterman does and our Jordans are located in our machine room.

"As a rule, I think this is more desirable, but, no doubt, in some cases, especially where the Jordans are located in the beater room, it might be just as well for the beater room gang to handle it as the machine room gang. I think it would depend entirely upon conditions at the mills and the kind of stock that you are running and whether or not you hold the beater room responsible for getting a certain grade of stock or not.

"Perhaps in running, for instance, a test stock and where you hold the beater room responsible for your tests, they should have control of the Jordans, but where you are running on common plain chipboard, there is no test and all you require the beaterman to do is to get your stock properly beat up. The Jordans can be located almost any place, but we prefer to have them located in the machine room under these conditions."

Another good reason for this method in such a mill is given by Mr. T. F. Farrell, superintendent of the United Paper Board Company, Wabash, Indiana, who says, "Jordans are much more favorable in the machine room, so that the machine tender can at all times conveniently regulate the stock to suit himself. In many instances, it has been my personal experience to have more difficulty in keeping help on the upper end of the machine, that is where the stock boxes are. Therefore, in many cases, the man at this post is not familiar with various qualities of stock, and he is not in a position to know whether the fibre is too long or too short. The responsibility therefore falls upon the machine tender, and if the Jordans were in the machine room, it would enable the machine tender to frequently, or infrequently, as is necessary, regulate the stock in accordance with the product desired. However, in this particular mill the Jordans are in the beater room." G. P. Cooney, superintendent of the Peninsular Paper Company, Ypsilanti, Michigan, manufacturers of rag and sulphite covers and colored specialties, says, "We find it necessary to have the machine tender operate his own Jordan because we make so many changes in weights of paper varying from 25 to 80 pounds basis 20x26. The machine tender can then refine the stock to suit the weight of the paper." The Detroit Sulphite Pulp and Paper Company, Detroit, Michigan, manufacturers of manilas, wrapping and tissues, have two of their Jordans in operation in the machine room, and three others in the beater room in close proximity to the machine room. As they make so many changes on the machine, sometimes five a day, the stock has to be constantly watched and changed frequently. Paul Zilske, assistant superintendent, says, "Our Jordans are all run by the machine tenders for the reason that they can then regulate the refining of the stock to give them the formation required."

Mr. O. L. E. Weber, manager Watab Paper Company, Sartell, Minnesota, manufacturers of newsprint and book papers, says, "Either our boss machine tender or machine tender attends the setting of the Jordan, as on our particular grades the brushing out of the stock is done almost entirely by the Jordan, and the machine tenders are therefore in better position to manipulate this stock than our boss beater men."

Conclusion

Summing up the foregoing opinions, one would say that the best method for operating the Jordan engines depends largely on where they are located and the character of paper in which a mill specializes. A beating engineer, one would naturally believe, should know best the kind of stock a specified sheet requires, and how long or how short the fibre should be, since that is his specialty. On the other hand, a machine tender is constantly watching the finished result as it comes from the machine and is there able to detect the slightest change in the formation of the stock. If it is caused from the stock being too long or too short, he should be able to immediately rectify it, either by changing the Jordan himself or requesting the beater man to do so.

What Next?

For the following reasons I am unable to send you the check you asked for, says a subscriber, and then goes on to elucidate: "I have been held up, held down, sand bagged, walked on, sat on, flattened out and squeezed. First, by the United States government for federal war tax, the excess profit tax and capital stock tax, merchant's license and auto tax, and every society and organization that the ingenious mind of man can invent, to extract what I may or may not possess. From the society of John the Baptist, the Navy League, the Red Cross, the Purple Cross, the Double Cross, the Children's Home, the Dorcas society, the Y. M. C. A., the Boy Scouts, the Jewish Relief, the Belgian Relief and every hospital in town. The government has so governed my business that I don't know who owns it. I am inspected, suspected, examined and re-examined, informed, required and commanded till I don't know who I am, or why I am. All I know is that I am supposed to be an inexhaustible supply of money for every known need, desire or hope of the human race; and because I will not sell all I have and go out and beg, borrow or steal money to give away, I have been cussed, discussed, boycotted, talked to, talked about, lied about, held up, robbed and nearly ruined. The only reason I am clinging to life at all is to see what in the h—l is coming next!"

Educate, organize, supervise, and conquer Carelessness, says the National Safety Council.

Specifications for Quicklime and Hydrated Lime for Use in Cooking Rags

DEPARTMENT OF COMMERCE
Bureau of Standards

THIS is the first of a series of specifications for the lime used in various chemical industries. To assist in the development of these specifications, the Bureau of Standards has called together an Interdepartmental Conference on Chemical Lime, composed of representatives of the Geological Survey and Bureau of Mines of the Interior Department; the Bureau of Soils, Bureau of Chemistry, and Forest Service of the Department of Agriculture; and the Nitrates Division of the War Department. The present specification, based on a draft originally prepared by F. A. Curtis, chief of the paper section, Bureau of Standards, has been unanimously approved by the above conference, and has also received the formal approval of the National Lime Association and the Technical Association of the Pulp and Paper Industry.

General

Use of Lime in Cooking Rags. Rags are cooked in a digester under steam pressure, with lime, soda ash, or caustic soda, or a mixture of soda ash and lime. They are then washed to eliminate as much noncellulose material as possible.

Either quicklime or hydrated lime may be used for cooking rags. The decision as to which to use is generally based on availability, cost, and present practice.

Definition of Quicklime and Hydrated Lime. Quicklime is the product resulting from the calcination of limestone. It will slake when water is added to it, and this slaking is accompanied by an evolution of heat and an increase in volume. It consists essentially of calcium oxide. Hydrated lime is a dry powder which is made by treating quicklime with enough water to satisfy its chemical affinity. It consists essentially of calcium hydroxide.

Requirements

Quality. It is obvious that a clean lime, free from dirt and gritty substances, is desired.

Composition. Quicklime and hydrated lime, to meet the requirements of these specifications, shall not exceed the maximum percentages or fall below the minimum percentages given in the following table:

Ingredients	Quicklime		Hydrated lime	
	Max.	Min.	Max.	Min.
	%	%	%	%
Calcium oxide.....	....	95	....	72
Magnesium oxide.....	2	....	1.6	....
Oxides of silicon, iron, and aluminum, and other insoluble matter	2	....	1.6	....
Carbon dioxide.....	2	....	1.6	....

Packing. Quicklime is shipped either in bulk in carload lots or barrels holding 180 pounds net or 280 pounds net each. Hydrated lime is shipped in paper bags holding 50 pounds net each.

Marking. Each package, or each carload of bulk material, shall be legibly marked with the names of the consignor and consignee, and with some means of identifying the particular contract on which the shipment is made.

This information is in additon to that required by the Federal lime-barrel law.

Sampling and Testing

Sampling. The purchaser will bear all expense of sampling and testing. When quicklime is shipped in bulk, the sample shall be so taken that it will represent an average of all parts of the shipment from top to bottom, and shall not contain a disproportionate share of the top and bottom layers, which are most subject to changes. The sample shall comprise at least 10 shovelfuls taken from different parts of the shipment. The total sample taken shall weigh at least 100 pounds, and shall be crushed to pass a 1-inch ring, mixed thoroughly, and "quartered" to provide a 15-pound sample for the laboratory.

When quicklime is shipped in barrels, at least 3 per cent of the number of barrels shall be sampled. They shall be taken from various parts of the shipment, dumped, mixed, and sampled as specified in the above paragraph.

In the case of hydrated lime, the sample shall be a fair average of the shipment. Three per cent of the packages shall be sampled. The sample shall be taken from the surface to the center of the package. The material so obtained shall be thoroughly mixed and quartered to provide a 2-pound sample for the laboratory.

When sampling quicklime or hydrated lime, it is essential that the operation be conducted as expeditiously as possible, in order to avoid undue exposure of the material to the air. The sample to be sent to the laboratory shall immediately be placed in an air-tight container in which the unused portion shall be stored until the shipment has been finally accepted or rejected by the purchaser.

The sample may be taken either at the point of shipment or at the point of destination, as agreed upon by the contracting parties. The maximum limit for carbon dioxide as given in these specifications holds only when the sample is taken at point of shipment. If it is desired to take the sample at point of destination, due allowance must be made in order that the lime manufacturer shall not be penalized for the carbon dioxide absorbed in transit.

Testing. The following directions are a brief summary of the analytical methods which are recommended. For more complete information on this subject reference should be made to the analysis of silicate and carbonate rocks, by W. F. Hillebrand, United States Geological Survey, Bulletin No. 700.

Blast 0.5 g. of the sample for 15 minutes in a platinum crucible. Cool, and transfer to an evaporating dish. Mix to a slurry with distilled water. Add 5 to 10 c. c. concentrated HCl. Heat gently until solution is complete, breaking up lumps if necessary. Evaporate to dryness on water bath. Add 5 to 10 c. c. concentrated HCl, and dilute with an equal volume of distilled water. Digest on water bath for 10 minutes. Filter, and wash with hot water. Evaporate the filtrate to dryness. Dissolve in acid and water as before. Filter, and wash with hot water. Ignite the two precipitates together, and weigh as silica and insoluble matter.

Dilute the above filtrate to 250 cc. Add HCl if necessary to insure a total volume of 10 to 15 cc. Make alkaline with NH_4OH. Boil until odor of NH_3 is barely noticeable. Filter, and wash slightly with hot water. Dissolve the precipitate with hot dilute HCl, and repeat the precipitation as before. Filter, and wash thoroughly with hot water. Ignite, and weigh as oxides of iron and aluminum.

To the filtrates from the above add a few drops of NH_4OH and bring to a boil. Add 25 cc of a saturated solution of $(NH_4)_2\ C_2O_4$. Continue boiling until the precipitate becomes granular. Let stand until precipitate settles clear. Filter, and wash with boiling water. Ignite the precipitate, dissolve in dilute HCl, and dilute to 100 cc. Add excess of NH_4OH, and boil. Filter out any insoluble matter, ignite and weigh, and add its weight to the oxides of iron and alumina found previously. To this filtrate, add $(NH_4)_2C_2O_4$, proceeding as before. Filter, and wash with boiling water. Ignite and blast to constant weight as calcium oxide.

Acidify the filtrates from the above with HCl. Evaporate to 150 cc. Add 10 cc of a saturated solution of $NaNH_4HPO_4$ and boil. Cool. Add NH_4OH drop by drop, with constant stirring, until the precipitate starts to form. Then add moderate excess of NH_4OH. Stir for several minutes. Let stand overnight. Filter, and dissolve the precipitate in hot dilute HCl. Dilute to 100 cc, add 1 cc of saturated solution of $NaNH_4HPO_4$, and precipitate as before. Filter, and wash with an alkaline solution made by diluting NH_4OH until it contains about 2½ per cent NH_3 and then adding a few drops of HNO_3. Ignite, and weigh as $Mg_2P_2O_7$. Multiply this weight by $^{40}/_{111}$ to find the weight of MgO.

Place 5 g of the sample in a small Erlenmeyer flask and cover with hot distilled water. Connect this flask into a carbon-dioxide train, set up as follows: Next to the flask is a reflux condenser, to which is connected a calcium-chloride drying tube, followed by a tube containing anhydrous $CuSO_4$, then another tube of $CaCl_2$, then by two tubes filled with soda lime, and finally by another tube of $CaCl_2$. The entire train must be so arranged that a stream of CO_2 free air can be kept passing through it. Start this stream of air. Weigh the tubes containing soda lime and replace them in the train. Add to the sample in the flask about 25 cc of 1:1 HCl, being careful that no gas is lost and that the effervescence is not too violent during the operation. When the effervescence diminishes, heat the flask, bringing the liquid gradually to boiling. Boil for 1 minute. Remove the flame and allow the flask to cool while the stream of air is still flowing, for 30 minutes. Disconnect and weigh the soda-lime tubes. Their increase in weight is recorded as carbon dioxide.

Retesting. Notice of the rejection of a shipment based on these specifications must be in the hands of the consignor within 10 days after the receipt of the shipment at the point of destination. If the consignor desires a retest, he shall notify the consignee within 5 days of receipt of the notice of rejection. The original testing laboratory shall keep the sample sealed airtight from the time they have taken out enough material for the original test until the expiration of the 15 days noted. The original testing laboratory shall agree to transmit the sample to any other laboratory for a retest at the direction of both of the contracting parties. This retest shall be at the expense of the consignor.

Salesmen to Meet in September

The first national meeting of the Salesmen's Association of the Paper Industry will be held in Chicago some time during the latter part of September. Definite arrangements have not yet been made, but the meeting promises to be an interesting one. The program with full and complete information regarding the meeting will be given out later.

The Whitaker Paper Company, whose home offices are in Cincinnati, O., has purchased the seven-story building at 48-52 Great Jones street, New York, which, after extensive alterations are completed, will be made the headquarters of the company in the East. The property, which covers a plat 60x90 feet, was valued at $225,000. The present New York offices are located at 75-77 Spring street.

Some Problems of the Pulp and Paper Industry

By D. C. EVEREST
Secretary and General Manager, Marathon Paper Mills Company

Address Given at Decennial Celebration, Forest Products Laboratory, Madison, Wis., July 23, 1920

IN PRESENTING some of the problems in which the Pulp and Paper Industry is interested, I intend to deal only with those which relate to the work of the Forest Products Laboratory and which we expect to be able to solve by intelligent coöperation with this institution.

In the beginning, I wish to say that even though this Laboratory has been in existence for ten years, Paper and Pulp manufacturers have not taken advantage of its remarkable facilities to any great extent, and, as a matter of fact, only comparatively few yet realize what a wonderful asset we have in this institution. What I have said of the Paper and Pulp industry, I believe applies equally as well to other branches of industry represented here today and those which have to deal with Forest Products in any form.

Had we as manufacturers of forest materials awakened to the value of the Laboratory to us and taken the interest in it, which is now apparently manifested, there would be fewer problems of our various industries today. Men connected with this institution have from the time of its establishment, been anxious and willing to coöperate with manufacturers in any way, and have only been prevented from rendering greater service on account of the failure of manufacturers to acquaint the Laboratory personnel with the problems confronting them. For ten years, the men here have tackled every problem which has been put up to them, and have rendered invaluable service to those who have realized the necessity of such work and have made use of the Laboratory in the manner intended when this institution was established.

Scarcity of Wood Demands Research

The present situation in the paper industry, abnormal as it is, has directed the attention of more manufacturers to the need of immediate and definite action in attacking the various problems with which they are confronted. The attitude in the past has been to take advantage of the improvements only as they have been made by a few progressive manufacturers and a tendency to procrastinate, even in this, has been rather common. The condition of the industry looking to the immediate future demands that these problems be attacked in such a manner as to produce definite results in the shortest time, for with the growing scarcity of pulp wood in the Eastern and Central States and our increasing dependence upon Canada for the supply of raw material, a situation has been created which can be rightfully viewed with alarm. While some research either in a haphazard manner or following a carefully coördinated plan has been carried on by the paper industry, it is safe to say that only those organizations in which the program of research was definite have succeeded in placing the manufacture of their products upon a sound basis, and are now able to take full advantage of their foresight.

When research is mentioned among paper mill men, and other timber users, too often the audience is unsympathetic if not hostile, and the tendency of many mill operators, has been to look with disfavor upon the efforts of investigators along scientific rather than the immediate practical lines.

In spite of all this, the pulp and paper section of the Forest Products Laboratory has been striving for the past ten years with inadequate funds and personnel for the work in which they are engaged to solve some of the pressing problems of the industry. The field is a large one, and most of the work pioneer in character. How successful they have been in their work may be judged from the following recital of the major problems which they have attacked and are now studying.

Pulp Wood Purchase Specifications

The need for definite specifications to cover the purchase of pulp wood has long been recognized. That the present basis of purchase, using the cord as the unit of measurement is inaccurate, can not be doubted. As the ordinary piled cord 4′x4′x8′ may, depending on the diameter of the bolts, freedom from knots, etc., contain by actual measurement from 104 to 65 cu. ft. of solid wood. Further, the present method of buying wood does not make a proper allowance for the percentage of decay. More than four years ago, an attempt was made to interest pulp mills in this problem, but until very recently nothing has been accomplished. However, field work financed by the American Pulp and Paper Association is now under way, and no doubt exists but that the results accomplished will meet expectations.

Closely connected with this problem and of more vital importance due to the growing scarcity of pulp woods is that of rossing, chipping, drying and baling of pulp wood preparatory to delivery to the pulp mill. With the vast pulp wood forests of the West prac-

tically untouched, it is felt that some such method as this may offer a solution to the decreasing supply of pulp wood in the East. This is now a cost of transportation problem.

Lumber Waste Enormous

For many years, the enormous amounts of the unavoidable waste in the lumber industry has challenged attention. Few pulp mills, however, have been in a position to utilize this waste, and have depended upon round wood for their supply. Conservation of timber resources will in time compel the utmost utilization of this waste, and the time is not far distant when lumber mills will undoubtedly undertake the barking of edgings and slabs, chipping and screening the wood and selling, in the case of hemlock, the bark to the tanneries.

The utilization of hemlock bark obtained from the barking drums has already been the subject of study upon semi-commercial scale, and it only remains to bring the tanner and pulp man to a mutual understanding of each other's problems. The burning of such bark is indeed a great waste if the value for tanning purposes as shown by the semi-commercial test is actually proven in the Commercial tests to be made, and there now seems to be no question about its being worked out satisfactorily.

The increasing cost and scarcity of wood labor has both reduced the supply and increased the value of hemlock bark. And in addition, the inability of the lumbermen to deliver peeled pulp wood to the pulp manufacturer has further increased the cost of this commodity.

The woods of the national forests, particularly those of the West, have been the subject of an intensive investigation looking toward their utilization by both mechanical and chemical processes. All the more important pulp wood species have been investigated, and samples are available on practically all the woods of importance from a pulp making standpoint. Local and economic conditions still remain to be studied, and since a great deal of this work was done prior to 1914, the greatly changed conditions necessitate a further survey.

Sulphite pulp can best be produced from the non-resinous woods, and the decreasing supply brings into importance the possibility of reducing resinous woods by this process. A successful solution of this problem would make available many cheap woods which can not now be used, and to a decided extent assist in overcoming the wood shortage.

Conservation and Use of By-Products

The possibility opened by the use of liquid sulphur dioxide, which can be obtained from the smelters, in the manufacture of sulphite acid has been a subject of much speculation, and while semi-commercial scale studies have pretty clearly indicated the results to be expected, it still remains for a mill scale demonstration to be made. The largest source of this material is, of course, in the West, and in addition to offering an outlet for an extremely objectionable nuisance. it would go far to eliminate the damage to which all vegetation in the vicinity of a smelter producing such fumes is subjected.

In line with the policy of conservation of by-products, investigations have been planned and carried out on the uses of waste sulphite liquor for the production of alcohol, binders, tanning materials, etc. When one considers that approximately one-half the weight of the wood is dissolved during the course of the cooking treatment and ordinarily runs to waste, some idea may be gained of the immensity of this problem. It may be that in time to come, the relative importance of the products of pulping may be reversed, as was done in the coke industry.

Hardly a sulphite mill exists but what experiences trouble with "pitch," and in spite of this, but little has been accomplished along the lines of pitch elimination. The laboratory equipment is too small to permit a comprehensive study to be made of this problem, but analyses in conjunction with changing cooking conditions will doubtless throw a great deal of light on the subject.

The study of fundamental cooking conditions in the soda and sulphate processes led to the development of a modified method of producing the sulphate pulp. By this method decreased chemical and steam consumption and increased yields were obtained, and while it has been impossible to conduct an entirely satisfactory mill scale trial, no doubt exists that this method is worthy of wide use.

Although sulphate pulp is not usually considered as easy bleaching, indications are that it can be successfully bleached, yielding a fair color with a higher ultimate yield than wood pulped by the soda or sulphite process. A pulp and paper making trial has just been completed where Southern pine pulped by the sulphate process has been bleached, and used to a large extent in the production of a satisfactory magazine sheet. This has been done without undue cost or sacrifice in yields.

One of the questions which is very frequently the subject of conversation when sulphate mill men get together is the relative advantages of diffusers and pans. This problem, however, can only be successfully attacked upon the mill scale, and the same applies to a study of the cause of corrosion of diffusers.

The successful recovery of chemicals from the waste liquor has always been of great importance, and any means which can be devised to raise the percentage of recovered chemicals would immediately be reflected in a decreasing cost for manufacture. Here again but little can be done upon a small scale.

Paralleling the recovery of by-products from sulphite liquors, distillation of those obtained in the soda or sulphate process offers a means of more fully utilizing the present waste. It is definitely

known that valuable products exist in the black liquors, but their recovery upon a commercial scale is not yet a complete success.

Salt cake has been universally used in the sulphate process to make up the chemical losses, but the use of niter cake offers certain advantages which, however, are offset by a few serious drawbacks. If opportunity could be given for a thorough investigation into the use of niter cake, this problem might be solved.

A constant source of trouble in the sulphate mill is found in the refractory material used in lining the smelters. While the conditions existing in a sulphate smelter doubtless offer great difficulty, it is not inconceivable that by intensive study a solution for this problem can be found.

Woods which are pulped by the alkali process lend themselves very readily to recovery of various products prior to pulping. So far, however, tannin is the only product which is now recovered on a commercial scale, but the high rosin and turpentine content of the Southern pines suggest that before long these materials will also be recovered. This problem can be very successfully attacked upon a laboratory scale and has already been too long delayed.

Scarcity of Stone for Pulp Grinders

There are but few quarries in this country where a successful grade of stone for pulp grinders is found, and the cost of the work necessary to experiment with new deposits is practically prohibitive unless the investigations can be first carried out upon a laboratory scale. Closely connected with this problem is that of developing a suitable artificial stone, and while many abrasive materials have been suggested, and some tried, the problem is not as yet unsolved. But here again the laboratory can be of great assistance.

The importance of keeping under control the production of mechanical pulp is receiving increasing attention, and a number of years ago was the subject of some study. Since that time, however, no opportunity has been presented for the laboratory to continue this work, although mill organizations are carrying on investigations along this line.

The loss of fibre in whitewater has been the subject of much discussion in the past, both from the standpoint of stream pollution and improving plant conditions. Because of the large volume of water which must be handled in order to recover the relatively small amount of fibre, certain difficulties present themselves at the start. But progress has certainly been made in the solution of this problem, and much more can be done if the matter is made the subject of an intensive study.

The effect of the various factors entering into the beating of pulp is not entirely understood, although progress is being made along these lines. In spite of the work that has been done with experimental beaters, it is not yet possible to apply the results obtained upon a small scale to mill conditions.

In connection with the conservation of waste materials the recovering of various waste papers such as paraffine and asphalt commands attention. Because of the difficulty of collecting these waste products, but comparatively little progress has been made, although the laboratory tests have successfully demonstrated that the impregnating material can be recovered without undue cost and the extracted pulp made into a satisfactory sheet. One mill is now being built for the extraction of paraffine and the manufacture of the waste paper into pulp.

Substitute for Sulphate of Alumina Needed

The study of a substitute for sulphate of alumina is a problem of utmost importance at this time, and if transportation conditions remain as they are today, and, seemingly, no miracle is going to happen to change these conditions under from three to five years, then we shall need some substitute for this commodity which we can obtain easily, possibly from some materials now employed in our pulp making industry. The conditions in the manufacture of sulphate of alumina today are a serious problem for the paper manufacturers. I understand some work has already been done along that line.

The study of paper specialties such as fibre containers, indurated ware, molded articles, artificial silks, twines and textiles requires a hightly organized research body, and progress has necessarily been slow along these lines. Work has been done in an attempt to develop water and grease proof containers, and a certain degree of success has attended the efforts.

Various raw materials other than wood are receiving an increasing amount of attention from the trade, and utilization of one such material, namely, cotton linters, has been successfully carried to commercial scale operations. Others such as the various grasses, straws and crop plants should be the subject of investigations, but must await the solutions of those problems which are more pressing, and which promise more valuable results.

Decay in Pulp Wood and Wood Pulp

Studies on the chemistry of pulps have been confined principally to the research carried on in the European countries, although the subject is of great importance in connection with the use of chemical pulp for manufacture into various cellulose derivatives. The lack of this knowledge was very forcibly brought home during the war when investigations of the suitability of chemical pulps for manufacture into nitrocellulose were seriously hampered by our ignorance of the subject. In the study of pulp wood and wood pulp decay, chemistry will, undoubtedly, play an important part in determining the various decomposition products formed by the decay organisms. However, it must be remembered that in all cases where

a chemical study of pulp or wood is made, complete data must be available relative to the previous treatment which the material has undergone. Too much work has already been done upon pulps whose origin was unknown. Of the various studies mentioned, this one alone requires the services of several highly trained men, and results could in no case be expected under several years' time.

The beginning of the study of this problem of deterioration in pulp wood and wood pulp to any great extent in the Laboratory was brought about by the experience we were having at the mill in which I am interested, with fungus growth in stored and purchased pulp. Owing to the serious problems of transportation during the war it became necessary to purchase wood pulp in full cargoes and store it rather than to depend on regular shipments by rail of freshly ground wood. This storing of large quantities of pulp and particularly in view of the high market value at the time, soon impressed one with the enormous loss due to deterioration both in money and quality of product. When this problem was taken up with the laboratory, it was found that practically all the funds were tied up for other work and that even though the funds were available, the necessary pathologists and others necessary to the prosecution of the work must be found. It was impossible to do anything until funds could be supplied, and according to regular practice, this would mean waiting until appropriations were made and the money available after July 1. This meant a delay of nearly a year, and, consequently, I undertook to raise sufficient funds from concerns engaged in pulp and paper manufacturing to defray the expense of this work until regular governmental appropriations would be made to cover it. Twenty-three concerns contributed $10,500.00. About one-fourth of the concerns addressed on the subject replied to the first appeal, and the reasons given by others for not contributing after the second and third appeals were made, showed that there was either a lack of knowledge on the part of many manufacturers both as to their own needs and as to the ability of the Forest Products Laboratory to handle such questions, or there is an epidemic of "tightwaditis" in this country when it comes to sensible propositions which are to be of benefit to our own business and the country generally. Let someone present a proposition involving the expenditure of millions of dollars for the assistance of some fool thing or other and men seem possessed to be the first on the list to give their personal or company funds, but a sensible program looking to the conservation of one of the greatest assets this country possesses, is passed up without giving any financial aid and by offering excuses, usually too thin for any use. Many said, "We are studying this problem in our laboratory," but we had all done that for years, and were no nearer a solution of the problem than when we started. It requires the best men obtainable in the country in several different lines, and it must be patent to everyone that a coördinated program being carried out in one place under such conditions as exist here would yield better results than if men equipped with only general chemical knowledge and working individually should undertake the study of this problem in private laboratories.

Some replied that this should be a Government matter and the Government should provide funds, etc., not seeming to realize that funds were not then available and that the loss to every manufacturer due to a delay of six or eight months in the solution of such a problem meant many times the amount they were asked to contribute.

If the Forest Products Laboratory is to be of the greatest possible assistance to the pulp and paper industry, closer coöperation must exist with the mills, for the final test of any laboratory trial must take place in the mill. Too often, information vital to the successful prosecution of a problem is withheld or full and hearty coöperation is lacking. If the mills refuse to give the laboratory their full confidence and at the same time maintain a critical and unsympathetic attitude but little real progress can be made on those problems in which the industry is vitally interested.

If, however, they look upon the Laboratory as a part of their own organization and treat it as such, correcting its mistakes and commending its successes, the greater portion of any research problem is already solved.

For an organization of this character to be so seriously hampered, both as to equipment and personnel is fatal to a rapid solution of the many problems with which it is confronted, and it is, of course, impossible to carry on intensive studies of the many pressing questions. Should a mill organization desire work done, the results of which would be of benefit to the whole industry, a coöperative arrangement can be made similar to the ones now in force with respect to pulp wood, and wood pulp decay, and pulp wood measurement. Or one or more men, financed by the mills, could be detailed to the laboratory for an intensive study of some problem under the direction of the laboratory organization. Either of these suggestions is in accordance with the laboratory policy of furthering the advance of exact knowledge of the industry with which they are so closely connected, and their adoption by any organization most heartily welcomed.

Funds Necessary to Continue Work

In summing up the problems of the pulp and paper industry, perhaps the one which is as important as any is in seeing that ample appropriation is made for the continuance of this work, so that with the necessary funds, the personnel of this laboratory may be built up to a point where we may rest assured that the problems confronting us may be solved. The personnel in the foundation of the whole thing depends on it. The Secretary of Agriculture has been

working to have the salaries of these men and women put on a basis comparative with salaries paid in private industry for like service, and in this, we must assist him in every way possible. Adequate salaries must be paid.

The necessity of such action rests not only on the paper and pulp industry but on every other branch of forest products conversion industry in the country. From my conversation with lumbermen and others connected with woodworking industry, I am convinced there is a woeful lack of information as to this work and the possible advantages of it to the individual concern.

Take, for instance, this problem of deterioration of pulp wood and wood pulp, experiments have demonstrated enormous losses in yield from infected wood and a falling off in quality which is surprising. Heretofore, deterioration of pulp wood and other forest products has been looked upon as a matter of course and no great effort made to correct it. We have heard of the rapidly decreasing timber supply, public men howl about it and newspapers harp on it continuously. Conservation has been preached by every man who could get an audience. Lumbermen and others of days gone by, have been criticised for what was at that time an unavoidable waste of unsuitable timber and what was a necessary waste to open up what is now our best agricultural territory. Criticism of everybody and everything has been the order of the day, but when it comes down to a proposition to finance this Laboratory, the only department of the Forest Service which can point the way to conservation of our natural timber resources after they are removed from the land, it is only after the greatest effort on the part of the Secretary of Agriculture, the Chief Forester and all others connected with that department, together with the efforts of various associations of industry represented here, the splendid work of some newspapers and trade journals and the actual work in committee of Congressman Nelson and Senator Lenroot, that Congress would appropriate barely enough to keep this institution alive for another year.

Another strange fact is that within a few months of the time the appropriation was fixed for the Laboratory, another committee made up of men from the same body which considered the appropriation, tack on to another bill an appropriation of $100,000.00 for the investigation of a substitute for pulpwood, cornstalks or sugercane. The same old story of finding substitutes for pulp wood but doing mighty little to find ways to save what we have. Probably none of those who dealt with the Underwood bill recalled that there was a well established laboratory for the purpose which they had not properly supported. If these gentlemen are sincere when they howl "Conservation," then their actions in providing for this institution belie their words. Most people lose their sense of proportion when dealing with large problems, and, unfortunately, Congressmen have proven no exception to this rule.

Forest Products Laboratory Must Live

We need this Laboratory. Private enterprise can not buy such facilities and conditions. You who have been privileged to see and know what is being done here must realize that if we are to solve our technical problems relating to timber, its care, perpetuation and proper use, we must back this Laboratory to the limit, either by inducing Congress to adequately provide for it or by individual subscription if necessary.

There is but one thing for the paper and pulp industry and other industries using forest products to do, and that is to earnestly work for a better understanding of the possibilities of this Laboratory service both on the part of the members of their respective industries and of those who have the responsibility and power to fix the sum which shall be expended in this work and in this manner we may expect to materially reduce the number of problems which confront the pulp and paper industry and your other industries as well.

I urge upon you, gentlemen, to give this institution the support it deserves in the solution of the scientific problems affecting our industries and which are so vital to our individual success and the conservation of one of the nation's most valuable natural resources.

Coal Production Table

THE table on the opposite page shows the net tons of anthracite and bituminous coal produced each year since 1900. It separates the production into states east and west of the Mississippi River.

On referring to the amount of bituminous coal produced in 1919, it will be seen that it lacked over 121,000,000 tons of that mined in the year 1918. This was due to the surplus which had accumulated from the overproduction of that year, when the Government urged its "Buy Early" propaganda. Approximately 40,000,000 tons were carried over and this added to the 458,000,000 tons produced, made a total of nearly 500,000,000 tons, which is said to be the consumption for that year. It is further estimated that the requirements for 1920 will be about 540,000,000 tons of which nearly 255,000,000 tons were mined during the first six months, or about 47 per cent. The statistics show that for the past seven years the production of the first six months in each year never equaled 50 per cent of the annual output. The production during the first six months of 1920 therefore can be considered normal.

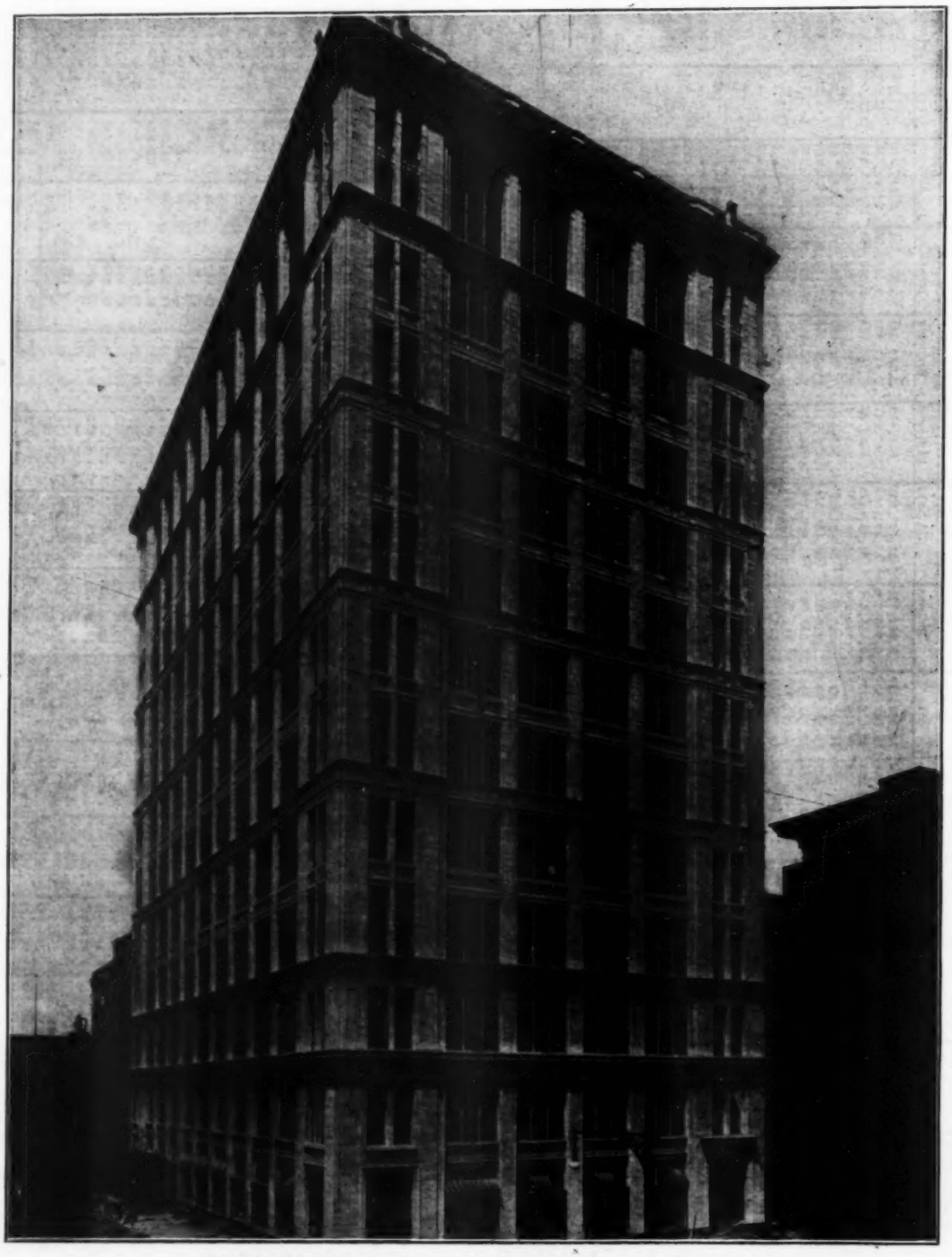
Timber from insect or fire killed trees is just as good for any structural purpose as that from live trees of similar quality, providing the wood has not been subsequently injured by decay or insects. Market dead trees before they suffer injury.

	ANTHRACITE PRODUCTION	EAST OF MISSISSIPPI RIVER													
	Pennsylvania	Virginia	West Virginia	Maryland	Pennsylvania	Ohio	Indiana	Illinois	Michigan	Kentucky	Tennessee	Alabama	North Carolina	Georgia	Total Bituminous Production East of the Mississippi River
1900	57,367,918	2,393,784	22,647,207	4,024,689	79,842,326	18,983,150	5,484,086	28,767,981	849,478	5,328,964	3,509,562	6,394,275	17,784	315,587	177,563,759
1901	67,471,667	2,725,873	24,068,402	5,113,127	82,305,946	20,943,809	6,918,226	27,331,552	1,241,241	5,469,986	3,632,290	9,099,052	12,000	342,828	189,205,324
1902	41,373,598	3,182,998	24,570,826	5,271,609	98,574,367	23,519,894	9,446,424	32,939,373	964,718	6,766,964	4,382,968	10,354,570	23,000	414,083	220,411,809
1903	74,607,046	3,461,307	29,337,241	4,844,165	103,117,178	24,838,108	10,794,692	36,967,104	1,367,619	7,538,032	4,798,004	11,654,324	17,309	416,961	239,134,029
1904	73,156,709	3,410,914	32,456,752	4,813,622	97,938,287	24,407,220	10,842,189	36,478,060	1,342,840	7,576,482	4,782,211	11,262,046	7,000	383,191	235,640,814
1905	77,659,850	4,275,271	37,791,580	5,108,539	118,413,657	28,582,950	11,895,252	38,434,563	1,473,211	8,432,522	5,766,690	11,866,069	1,557	351,991	269,363,633
1906	71,282,411	4,254,879	43,290,350	5,435,452	129,293,206	27,731,640	12,092,560	41,480,104	1,346,339	9,653,647	6,259,275	13,107,963	-	332,107	294,277,522
1907	88,604,312	4,710,895	48,091,563	5,532,628	150,143,177	32,142,419	13,965,715	51,317,146	2,035,856	10,753,124	6,810,243	14,250,454	-	342,401	340,135,641
1908	83,268,754	4,259,042	41,897,843	4,377,092	117,179,527	26,270,639	12,314,890	47,659,690	1,835,019	10,246,503	6,199,171	11,604,593	-	264,622	284,109,862
1909	91,070,859	4,753,217	51,849,220	4,023,241	137,966,791	27,939,641	14,334,259	50,904,990	1,784,692	10,697,394	6,358,645	13,703,450	-	211,196	325,028,726
1910	84,485,236	6,507,997	61,671,019	5,217,125	150,521,526	34,209,668	18,389,815	45,900,246	1,534,967	14,623,319	7,121,380	16,111,462	-	177,245	361,988,769
1911	90,464,667	6,364,667	59,831,560	4,685,795	144,561,257	30,759,986	14,201,358	53,679,118	1,476,074	14,049,703	6,433,156	15,021,421	120	165,210	351,729,442
1912	94,361,598	7,846,638	66,786,687	4,964,038	161,845,489	34,328,727	15,285,718	59,885,226	1,206,230	16,490,821	6,478,228	16,100,600	200	227,503	391,660,804
1913	91,524,922	8,828,066	71,254,134	4,779,839	173,781,217	36,300,027	17,165,671	61,618,744	1,231,786	19,616,600	6,860,184	17,678,822	-	255,626	419,270,920
1914	90,821,307	7,959,535	71,707,626	4,153,347	167,983,294	18,942,115	16,641,127	57,589,197	1,268,080	20,382,765	5,943,256	18,858,422	-	166,498	386,226,417
1915	86,995,061	8,122,596	77,194,069	4,180,477	157,955,137	22,434,691	17,006,152	58,829,876	1,156,139	21,361,674	5,730,361	14,927,937	-	134,496	389,023,304
1916	87,578,493	9,707,474	86,460,127	4,460,046	170,295,424	34,729,219	20,093,948	66,195,336	1,180,260	25,393,997	6,137,449	18,086,197	-	173,554	442,911,731
1917	99,611,811	10,097,091	86,441,667	4,745,924	172,448,142	40,748,734	26,539,329	86,199,387	1,374,805	27,907,971	6,194,221	20,068,074	-	119,028	482,774,373
1918	98,826,886	10,289,808	99,935,839	4,497,297	178,560,741	45,912,942	30,479,634	99,291,105	1,464,818	31,612,617	6,831,048	19,184,962	1,420	66,716	508,217,948
1919	84,200,000	9,500,000	75,900,000	2,970,000	148,300,000	35,050,000	20,500,000	64,600,000	930,000	28,500,000	5,150,000	15,230,000	-	-	403,230,000
Total 1900 to 1919 Incl.	2,415,731,419	125,131,019	1,102,723,754	93,180,253	2,718,036,668	585,644,073	308,109,644	1,033,056,298	27,079,219	302,302,844	115,374,346	283,299,393	80,340	4,981,000	6,693,997,849
Average per no. 1917.	8,300,984	840,591	7,203,472	345,494	14,370,678	3,395,728	2,211,611	7,183,292	114,567	2,317,331	514,518	1,672,339	-	9,919	40,231,198
" " " 1918.	8,235,907	857,484	7,494,627	374,775	14,879,228	3,817,745	2,556,503	7,440,925	122,068	2,634,388	569,254	1,599,747	118	5,559	42,351,495
" " " 1919.	7,183,333	791,667	6,291,667	247,500	13,108,333	2,920,833	1,708,333	5,383,333	77,500	2,375,000	427,500	1,269,166	-	-	33,602,500
" " " 1920.	6,985,333														
Anthracite Production Jan. to June 1920 Incl.	41,912,000														

(The lower half is the right hand portion of the complete table)

	WEST OF MISSISSIPPI RIVER																Grand Total Bituminous Production.
	Iowa	Missouri	Arkansas	North Dakota	Kansas	Oklahoma Indian Territory	Texas	Montana	Wyoming	Colorado	New Mexico	Utah	Washington	Oregon	California	Miscellaneous	Total Bituminous Production West of the Mississippi River
1900	5,202,939	3,540,103	1,447,945	129,883	4,467,870	1,922,298	966,373	1,661,775	4,014,602	5,244,364	1,299,299	1,147,027	2,474,893	58,864	171,706	1,210	32,752,353
1901	5,617,499	3,902,088	1,816,136	166,601	4,900,528	2,421,781	1,107,953	1,396,081	4,455,374	5,720,015	1,086,545	1,222,614	2,578,217	69,011	151,079	1,800	36,632,823
1902	6,904,768	3,890,154	1,943,932	226,511	5,266,065	2,820,666	901,912	1,560,825	4,429,491	7,401,342	1,048,765	1,574,521	2,681,214	85,648	84,984	4,042	39,905,035
1903	6,419,811	4,238,586	2,229,172	278,645	5,859,976	3,517,288	926,759	1,488,810	4,625,293	7,423,602	1,541,781	1,65[illegible]409	3,195,273	91,444	104,678	4,297	43,615,819
6,119,935	4,168,308	2,009,451	271,928	6,333,307	3,046,539	1,195,944	1,358,919	5,178,556	6,658,355	1,457,325	1,493,027	3,137,681	111,540	78,889	4,174	43,019,875
6,798,609	3,983,378	1,934,673	317,542	6,423,979	2,924,427	1,300,624	1,643,835	5,502,021	8,826,429	1,649,933	1,332,372	2,964,926	109,641	77,050	9,656	45,699,152
7,266,224	3,758,008	1,864,268	305,689	6,024,775	2,860,200	1,512,875	1,829,921	6,135,934	10,111,219	1,964,713	1,772,561	3,276,184	73,721	85,290	11,706	48,897,348
7,574,322	3,997,936	2,670,438	347,760	7,322,449	3,642,658	1,648,089	2,016,887	6,282,990	10,790,236	2,628,959	1,947,607	3,682,522	70,933	18,950	17,727	54,622,471
7,161,310	3,517,315	2,078,357	320,742	6,245,508	2,945,116	1,995,577	1,920,190	5,489,952	9,634,973	2,467,937	1,846,792	3,024,943	86,259	18,755	8,586	49,465,062
7,757,762	3,756,580	2,377,157	422,047	6,986,478	3,119,377	1,824,440	2,553,940	6,393,109	10,716,956	2,801,128	2,266,829	3,698,262	87,276	45,826	7,355	54,719,521
7,929,120	2,982,433	1,905,958	399,041	4,921,451	2,646,226	1,892,176	2,920,970	7,537,089	11,973,756	3,509,221	2,517,809	3,911,899	67,533	11,144	5,448	58,125,373
7,331,648	3,836,107	2,106,789	502,628	6,178,728	3,074,242	1,974,593	2,976,358	6,744,864	10,157,388	3,148,158	2,513,175	3,572,815	45,461	10,747	2,721	54,177,622
7,289,529	4,339,856	2,100,819	499,480	6,986,182	3,675,418	2,188,612	3,048,496	7,369,124	10,977,926	3,536,824	3,018,149	3,360,932	41,657	10,975	3,319	59,444,178
7,525,936	4,818,125	2,234,107	495,320	7,202,210	4,165,770	2,429,144	3,240,975	7,393,066	9,222,510	3,703,806	3,264,828	3,977,391	44,065	24,939	14,789	59,164,377
7,451,022	3,935,980	1,834,540	506,685	6,860,988	3,988,613	2,325,773	2,805,173	6,475,293	8,170,559	3,877,689	3,105,036	3,064,920	51,558	"	25,524	54,477,553
7,614,143	3,811,593	1,652,106	528,078	6,824,474	3,693,580	2,088,908	2,789,785	6,554,028	8,624,930	3,917,940	3,108,715	2,429,095	39,881	"	24,496	53,601,132
7,260,800	4,748,146	1,994,918	634,912	6,881,456	3,608,011	1,997,503	3,632,527	7,910,647	10,484,237	3,793,011	3,567,428	3,038,588	42,592	7,240	9,866	59,600,838
8,965,830	5,670,549	2,143,579	790,568	7,184,975	4,886,844	2,358,815	4,225,689	8,578,619	12,483,356	4,000,527	4,125,250	4,009,902	28,327	6,422	8,062	68,961,235
8,192,195	5,667,730	2,227,369	719,733	7,561,947	4,813,447	2,261,135	4,522,805	9,429,668	12,407,571	4,023,239	5,136,825	4,092,718	13,328	6,900	82,548	71,167,872
8,300,000	4,060,000	1,480,000	750,000	5,750,000	3,200,000	1,600,000	3,300,000	7,100,000	10,100,000	3,170,000	4,570,000	3,100,000	"	"	100,000	54,790,000
242,782,398	81,822,925	40,258,711	8,613,773	126,163,345	66,476,601	34,084,043	50,903,893	127,708,749	197,119,613	54,525,899	51,298,014	64,961,450	1,217,325	550,004	348,624	1,089,418,496
747,162	472,547	178,632	65,879	898,748	365,570	196,318	352,141	714,635	1,040,276	333,377	342,102	334,159	2,361	525	670	5,746,769
692,663	472,311	185,614	59,978	830,162	401,121	188,428	277,709	786,567	1,033,964	335,269	429,069	340,184	1,111	533	6,962	5,990,656
525,000	336,333	140,000	62,500	479,166	266,667	133,333	275,000	891,666	841,666	264,166	380,833	258,333	-	-	8,333	4,565,000
															Bituminous Production Jan. to June 1920 Incl.	2,4,987,092

COAL PRODUCTION TABLE— (See opposite page)



Publishers' Building in New York City, Showing Steel Windows.

Daylighting the Paper Mill

By G. A. KAHN
Truscon Steel Company

DAYLIGHTING has become in late years one of the most important considerations in the design of the modern factory building. Proper natural illumination has resulted in increased efficiency of workmen, not only as regards quality of work, but also in morale, avoiding accidents, and less cost of artificial light.

Manufacturers have come to realize that in a well daylighted factory the workmen unconsciously increase their output. Their work is finer and more accurate, their machines and tools better taken care of, and their entire attitude of mind improved by the clean, cheerful influence of natural illumination, which is the nearest approach to outdoor life that it is possible to secure.

It has been estimated that about 25% of avoidable accidents are due in some degree to faulty lighting. In a poorly lighted factory, machinery, even though protected by guards, is a constant source of danger to the workman. Dark passageways, floors cluttered with tools and refuse, contribute their share to the list of accidents. All of this is to a very great extent eliminated by the proper distribution of natural light.

Aside from the advantages of proper daylighting, which have been mentioned, there is a practical economy in the cost of artificial lighting which cannot be ignored. It has been found in many new plants that the number of hours of artificial lighting has been reduced appreciably, effecting a considerable saving in the cost of light bills in the course of a year.

The extreme importance of proper daylighting of the factory has evidenced itself in recent years by the increased interest which manufacturers are paying to this feature of the design of their plants, and by the actions of the Industrial Commissions of various states such as Ohio, Wisconsin, New Jersey and others. These states have issued industrial lighting codes, giving minimum intensities of light required for various classes of work, and limitations in regard to size, location of windows, etc. For example, the Wisconsin code covering office work requires a glass area equal to at least 20% of floor area, and the distance of any working position not to exceed 2.25 times the height of the top of the window above the floor, where windows are located on one side only; and 4.5, where windows are on two sides. Height of windows, the advantages of steel windows over wood, kind of glass and other points are discussed.

This great movement towards better daylighting has been accomplished principally by the development of modern construction. Structural steel and reinforced concrete skeleton construction, and steel windows, have replaced the dark confining walls which were necessary to carry the weight of the old type of factory building. The few openings which could be used for windows were enclosed with wood sash having heavy wood frames and muntin bars, making them very inefficient for lighting purposes. The steel window, with its light rigid members not only allows 25% more glass area than wood windows of the same masonry opening, but on account of its great strength allows the use of any size of openings required. The modern factory invariably uses steel windows, and has window areas occupying 50% to 80% of the wall space.

Strathmore Paper Co, Woronoco, Mass.

Steel windows have in recent years been developed to a high degree of perfection, not only in regard to design and operation but in their efficiency in various locations of buildings and for various types of buildings. The most common types are sidewall factory sash, with pivoted ventilators, top-hung continuous sash for monitors and sawtooth roofs and sliding sash, the latter type being designed for the higher class of industrial buildings.

The amount of light required is dependent entirely on the class of work carried on in the factory.

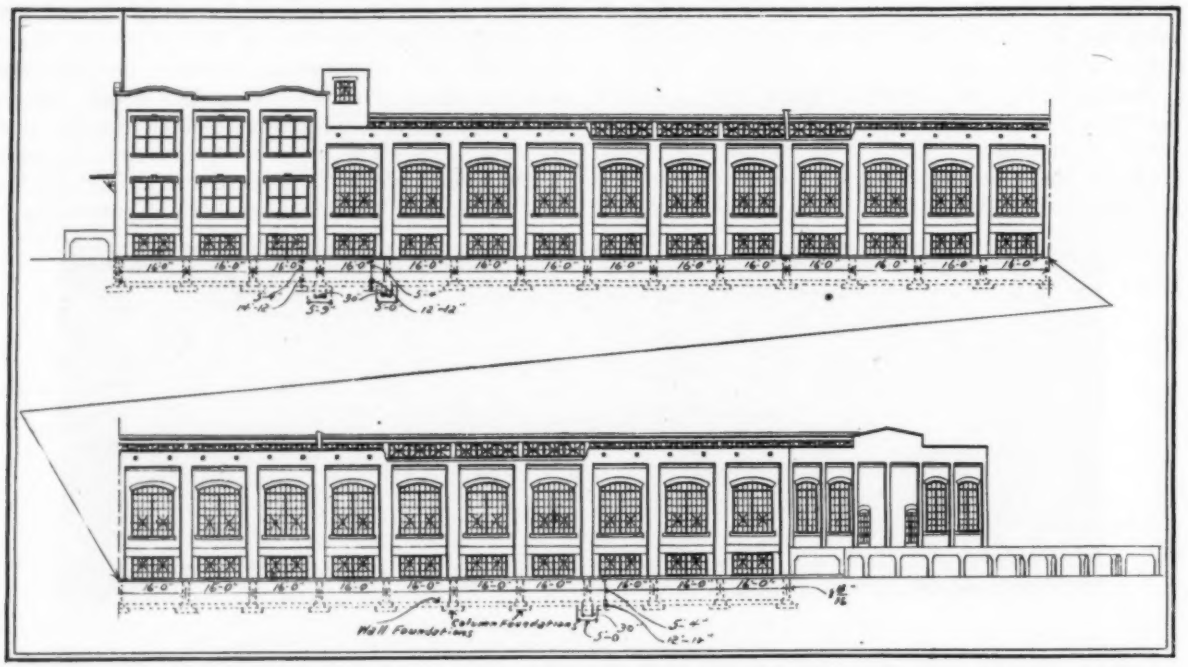
Exacting and careful work such as is required in machine shops, textile mills, etc., requires a large amount of light.

In years past, the feeling has been prevalent that paper mill work did not require efficient lighting, due to the fact that a large part of the work is done by automatic machinery requiring little attention and few workmen. It has been found, however, that effective lighting is almost, if not quite, as important to a great many operations in the paper mill today as it is in the textile industry, especially in the manufacture of the higher grades of paper, in the manufacture of paper cartons (which has become an important industry) and in many other developments of paper making.

The proper lighting of machinery, the cleanliness of the factory and the increased efficiency of the workers is as important here as in the machine shop. The paper mill of today is well lighted. In the past few years, many model paper mills have been erected in the state of Michigan. The Eddy Paper Co., at Three Rivers, Mich.; the Standard Paper Co. of Kalamazoo, the Monroe Binder Board Co. of Monroe, Mich., and many others in this state have erected model factories efficiently lighted with large expanses of steel windows.

The buildings now in process of erection at the Eddy Paper Co., Three Rivers, Mich., consist of a stock room approximately 370 ft. x 160 ft., a reinforced concrete building with basement, two-story and four-story portions. The beater and jordan rooms are in an L-shaped building of the monitor type, approximately 120 ft. x 192 ft. The machine room is 80 ft. x 304 ft. and roll storage is 200 ft. x 80 ft. Steel windows are used throughout, giving a total glass area of approximately 25,000 sq. ft.

The Standard Paper Co.'s new building is a one-story and basement concrete frame building about 120 ft. wide and 420 ft. long. The building is well lighted by steel windows, approximately 10 ft. x 12 ft. in each panel of the sidewalls. In addition to this, there is a monitor running the entire length of the building, containing pivoted sash about 3 ft. 6 in. high. The percentage of window area to floor space is about 20%, giving a factory space which appears as well lighted as the outdoors. The basement is also well lighted, having a large steel window in every panel, although this space is intended only for storage. The effect of this lighting will be noticed in the production records of this company.



South Elevation—Factory and Office Buildings of Standard Paper Company, Kalamazoo, Michigan

The new buildings designed for the Monroe Binder Board Co. consist of a series of buildings of a combined length of approximately 800 ft. and width of 120 ft. These buildings include a wareroom, machine shop and engine room, beater room, paper stock, paper machine rooms, etc. The principal buildings are one-story, of the monitor type, with steel window openings in the sidewalls of about 12 ft. x 10 ft. The monitors are enclosed with pivoted steel sash, the pivoted sections operated from the floor by a mechanical operating device controlling an entire length of monitor from one station. In the courts between the old buildings and the new, steel fire windows passed by the Board of Fire Underwriters are used. A total of 17,000 sq. ft. of steel sash was required for this layout.

Power Plant Management

Standard Practice for Hand-Firing

By ROBERT JUNE, M. E.

This is the fifth in a series of articles by Mr. June, on power Plant Problems. Succeeding articles deal with mechanical stokers, influence of furnace design, principles of heat absorption, coal and ash handling equipment, storage of coal, abuse of steam, etc. Later articles sum up the best current practice in the business management of the power plant. The series is timely and should prove of value to our readers.—Editor.

A MINER will produce, on the average, 10 tons of coal per day, 22 days per month. This is at the rate of 220 tons monthly or 2640 tons yearly.

Our present annual consumption of bituminous coal for industrial purposes, is fully 250,000,000 tons. Of this amount, we are wasting today, in a preventable manner, anywhere from 10 to 25 per cent. Conditions are improving. Let us give ourselves the benefit of the doubt, by conceding a 10 per cent waste. That is 25,000,000 tons.

25,000,000 tons! The figures slip glibly enough from our tongues; for are we not all infected with cyphorosis, and used to dealing in big sums? But if we would realize the magnitude of the loss, we must resolve it into concrete terms which can be visualized. 25,000,000 tons is 500,000 carloads—enough to make a train 3840 miles from engine to caboose, long enough to reach from New York to our battle front in France where its energy belongs.

This train represents the continuous labor for a year, of 85,000 men. We would have 4 new divisions of over 20,000 men to send against the Kaiser if we would eliminate the waste. Were we to utilize the 25,000,000 tons instead of wasting it, we would have the heat and power required to produce a combined fleet of 50,000 motor trucks, 50,000 tanks, 50,000 air planes, 2500 submarine chasers, and 250 merchant vessels.

Of the various sources of coal waste in the power plant, improper firing is among the most important. Also, given a fair measure of intelligence, good intention, and determination to improve operation on the part of the boiler-room crew, improper firing may be easily bettered.

There are two general methods of hand-firing; first, the spreading method; second, the coking method.

Spreading Method

In the spreading method, a small amount of coal is fired at one time, and spread evenly over the fuel bed, front to rear. In order that the entire fire may not be blanketed with green coal, the surface of the bed is divided into sections which are fired alternately. Thus on a furnace with three firing doors, the rear half of the grate is fired through doors one and three, and the forward half through door two, at the same time. At the next firing the arrangement is reversed, and the forward half of the grate fired through doors one and three, and the rear through door two.

Coking Method

In the coking method, fresh coal is fired to considerable depths at the front of the grates, and when nearly or wholly coked, is pushed to the back of the furnace. The object is to maintain a bed of incandescent carbon at the rear of the grate, in passing over which the volatile from the green coal at the front will be burned. This method is particularly adapted to furnaces wherein gases pass horizontally over the fire.

Before each firing, the coked fuel is pushed back leaving about one-third of the grate bare and all of the green fuel is fired on the bare grate. The fire door is cracked slightly to admit air for the volatile gases.

Of the two methods, it may be said that modern practice leans more and more to the spreading method. This is because of its evident tendency to produce higher efficiency, higher CO_2, lower flue gas temperature, and more uniform steam generation—results attributable to greater constancy in furnace temperatures.

On the other hand, the coking method produces less clinker, since the levelling of the fire at the firing period shakes more ash through the grates. The longer firing period produces a general lowering in CO_2, and there is a tendency to admit excess air through the thin spots. The coking method cannot be used successfully with a fluctuating load, as holes which cannot be seen develop in the rear of the fuel bed.

Standard Practice for Hand-Firing

The position of the fireman and the location of the coal pile have a great deal more to do with securing good results in hand-firing than is generally realized.

The fireman must take a proper position so that he can see the thin spots and can throw the coal onto them with the least effort. He should stand 4½ to 5 feet in front of the furnace, and 12 to 18 inches to

the left of the center of the door. See Fig. I. He should then be about two feet from the coal, which is 6 or 7 feet from the furnace front and should preferably be on a car, or an elevation, knee-high from the floor.

The scoop should travel in a nearly straight line. At the end of the throw, the scoop should suddenly

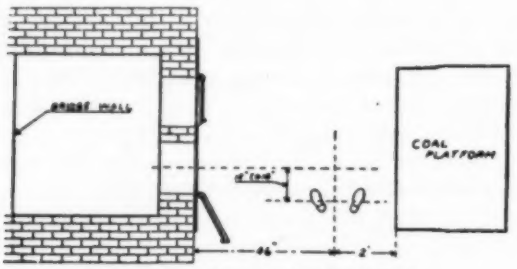


Fig. 1—Proper Position for Hand Firing

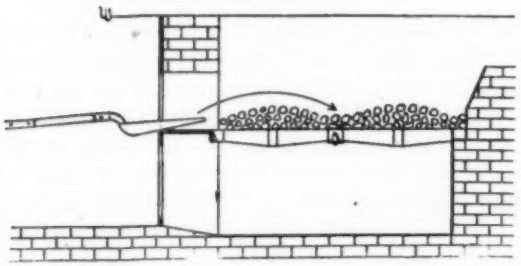


Fig. 2—Proper Position of Scoop at End of Throw

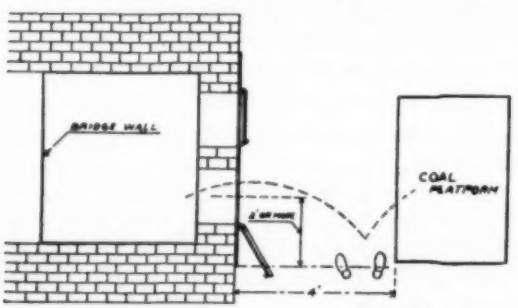


Fig. 3—Improper Position for Hand Firing

be stopped by laying it on the bottom edge of the door frame. The coal then flies off and is scattered over the proper spot. By thus stopping the scoop, the fireman saves effort, and locates the coal better. See Fig. 2. If he pushes the scoop way into the furnace, he has to jerk it back to get the coal off.

Hand-firing is hard work, and requires considerable judgment and skill. There should be sufficient firing space for handling the shovel and tools.

If the coal is closer than 6 or 7 feet, the fireman is crowded and will stand away to one side of the door to avoid the intense heat. He cannot see the fire, and throws the coal in by guess. His scoop travels in the arc of a circle, scattering coal on the floor, and dumping it in a heap directly inside of the door. See Fig. 3. This results in an uneven fire, low efficiency, and requires raking of the coal onto the back of the fire.

Provide a smooth firing floor, or a smooth bottom to the coal car, so that the shovel does not hit bumps or rivets. Such obstructions delay the firing operation, keeping the door open longer than necessary and admitting an excess of air.

Benefits of Rapid Combustion

Coal should be burned rapidly and at high temperatures in order to secure the best available economy. Fire small quantities of coal at short intervals, so that thin places do not burn through and admit large excess of air. The quantity depends upon the grade size and the drafts. With a draft of one inch in the uptake, 2 to 2½ lbs. per square foot of grate is a good average. Thus, on a grate 6 by 8 feet, 100 to 125 lb. of coal, or about 6 to 9 shovelfuls, would be the quantity for one firing. The intervals should be about five minutes. For a higher draft, the periods could be three minutes, with a weaker draft, they could be lengthened to eight minutes, but under ordinary circumstances should never be more than ten minutes. This method makes the coal supply more nearly proportional to the air supply, which in most hand-fired plants is nearly constant.

The following are reasons for light and frequent firing: When fresh coal is fired, the volatile matter is immediately distilled. The process is nearly completed in 2 to 5 minutes; therefore immediately after firing, large quantities of air should be admitted over the fire. After 2 to 5 minutes, it should be cut down. Such regulation is practically impossible. As the air supply is practically constant, immediately after firing it becomes insufficient, and incomplete combustion results. After most of the volatile matter has been driven off, the air is in excess. The two losses are much less when small amounts are fired at frequent intervals. Automatic air control devices can be purchased, but even with them, frequent and light firing is best. Frequent firing alleviates the tendency to form a crust on the top of the fuel bed.

Cover Up the Thin Spots

A skilful fireman can, at a glance, estimate the amount of coal required at a given spot. Almost unconsciously he picks the right amount, and selects the right mixture of fine and coarse coal. If the coal is burned way down, he selects coarse coal, to avoid its sifting through the grate. This also permits of the building up of the level on the spot more quickly, as the coal does not tend to fuse so much as slack. Thin and thick spots will occur, even with most careful firing. In places where the air flows freely, the coal burns faster, forming a thin spot. The cause of the variation in air flow may be the difference in the size of the coal, the accumulation of clinker or the fusing of coal into a hard crust. Before firing fresh coal, the fireman should note the thin places. They have bright, hot flames, while high spots have smoky flames or none at all. Cover the holes, if burned through, with incandescent coal

before firing. Place the coal on the thin spots in thin layers. If deep hollows are filled at once, fresh coal may fuse and choke off the air, forming a new high spot. If high spots are missed for one or two firings, they will burn down to normal. If the high spot is due to clinker, the clinker must be removed.

Thickness of Fire

With one-inch draft available at the breeching, firing run of mine coal, a 4 to 8-inch fuel bed is best; the coarser the coal the thicker the bed. A thick bed offers more resistance than a thin one. Therefore with the same available draft, there is less air passed through a thick fuel bed, which means a lower rate of combustion and lower capacity. If difficulty is experienced in maintaining steam pressure with a thick fuel bed, it may be possible to overcome the difficulty by carrying a thinner bed. The objection to a thin fuel bed is that too much air flows through without uniting with carbon, but a thin fuel bed does not pass oxygen through unburned, unless there are holes in it. Evidence shows that from a fuel bed 3 to 4 inches thick, the gases rising from the surface average less than two per cent oxygen, and about 25 per cent combustible gas. As a result, considerable air must be admitted through the fire-doors and other openings to burn the combustible gases. A thick fuel bed does not necessarily decrease the free oxygen in the flue gas, but may actually increase it. Thickening the fuel bed increases the resistance to the passage of air there through. The draft, however, does not increase as rapidly as the resistance. As the fuel bed is thickened, less air passes through it, and less combustible gas rises from its surface.

The higher draft, however, brings in more air over the fuel bed, resulting in a greater amount of free oxygen in the flue gases.

The Smoke Problem

Hand-fired furnaces, as a rule, are most obstinate smoke producers. Although they can be operated efficiently without the production of objectionable smoke, the result depends more upon the fireman than upon the design of the furnace. The chief difficulty with hand-fired furnaces lies in the intermittent nature of the firing. When a fresh charge of coal is fed into the furnace, an enormous volume of volatile matter is evolved. For complete combustion, a corresponding amount of air must be supplied and intimately mixed with the volatile gases before contact is made with the comparatively cool heating surface. In the average hand-fired furnace the combustion chamber is so small and the heating surface is so close to the grate that the partly burned gases strike the heating surface before oxidation is complete, and combustion is hindered or even completely arrested. The most economical and smokeless hand-fired plants are those that approach the continuous feed of the mechanical stoker.

Minimizing Smoke in Cleaning Fires

Two methods of cleaning fires in hand-fired furnaces, are in general vogue. In the side method, one side of the fire is cleaned at a time. In the front to rear method, the burning coal is pushed with the hoe against the bridge wall, the clinker from the front half of the furnace is loosened and pulled out, and the burning coal is spread over the bare grates, the process then being reversed for the rear half of the furnace. For smokeless operation, the side method is preferable, and should be carried out as follows:

Build up the fire on one side and let the other side burn down. Just before cleaning, "wing" over the live coal from the burned-out side and pull out the clinker and ash, cleaning the grates thoroughly. Cover the clean grates with green coal and push over live coal from the other side. When the cleaned side has become thoroughly ignited and the volatile matter has passed off, throw in coal to fill the spots not covered and pull the clinker and ash out of the other side. Cover the grates with green coal as before, winging over live coals from the opposite side. Keep the panels wide open and allow the fresh coal to ignite thoroughly. Never allow the fire to burn low before cleaning if carrying a heavy load, as there is a possibility of losing the steam pressure.

Keeping Down Smoke in Banking Fires

The following rules represent the best standard practice in eliminating smoke in banking fires: Throw 15 or 20 scoops of coal on each side. Open the panel doors slightly, close the ashpit doors and partially close the damper. To break up the bank, level the fire, with the panel doors open, and start firing by the usual method, making sure the damper is wide open.

Keep the fire bright by the spreading method, using the panel doors and steam jets, and regulate the steam pressure with the ashpit doors. This insures a temperature in the furnace high enough to maintain the brickwork at the igniting point of the coal and promotes combustion of the volatile matter. At the same time, it keeps down the distillation of the volatile matter to a low rate, and by having the damper open and the panels cracked, the circulation of the gases is not retarded. Do not try to regulate the steam pressure by the damper or smoke will be produced.

The method just described is contrary to the general rules for firing, but its philosophy is explained in the following manner: If a shovelful of coal is thrown on a bright fire by the spreading method, every particle of that coal is immediately subjected to the intense heat of the fire and the volatile matter is rapidly driven off. If this is followed by more coal, the result is a volume of volatile matter which is beyond the capacity of the furnace to handle without dense smoke.

If, on the other hand, the fuel is fired in a lump from the shovel without spreading, there is a considerable quantity of the coal which does not immediately become subjected to the high temperature. The coal on the outside of the pile gives up its volatile and the coal within is not affected until the volatile matter has been distilled from the outside lumps. Furthermore, the volatile matter from the inner portions of the pile must pass outward through the incandescent outer layer of fuel, much in the same way as in the underfed stoker. In this way the production of smoke can be retarded, and the more coal thrown on the fire at once, the less smoke. Two shovelfuls of coal fired by the spreading method on a clean, bright fire will make more smoke than ten shovelfuls of coal fired by the lump method. In practice, it will be necessary to determine just how much coal should be fired at once, but six or eight shovelfuls on a side with the draft operated according to the method ordinarily used will be found to be about right.

When a battery of boilers is to be fired, the fires should be fed by the alternate method, as before, passing from one boiler to another until they are all charged and then repeating on the other side of the furnaces. It should be determined by experiment, however, just how many furnaces can be fired consecutively without producing dense smoke, and after this has once been made known, the fireman should adhere strictly to the rules laid down in this regard.

Installing and Operating a Cost System in a Coating Plant

By HARRY C. BRADFORD

In the following article the author has explained a very simple method of keeping costs in an ordinary coating mill, together with some practical suggestions in regard to its operation.—Editor.

THE department should be first decided upon. In an ordinary plant, there should be color and coating departments, calender department, cutter department, sorting department, trimming department and box department. You should next find out the value of building and equipment of each department. If it is a new plant, this can be obtained from invoices, and if not it no doubt has had a recent appraisal. Use the sound or depreciated values unless you have a 1913 appraisal; then use replacement values. The value of equipment of each department can be easily obtained from appraisal. The value of buildings except power plant, can be all added together.

The depreciation, fire and tornado insurance, taxes, and interest on capital should be divided on total value of all equipment, except power plant; all the building except power plant; and then all the power plant.

The depreciation, fire and tornado insurance, taxes and interest on capital should be divided up according to the value of equipment in each department.

The proportion of depreciation, fire and tornado insurance, taxes and interest on capital on building should be used to make the department expense.

Power

If you are generating all of your own power, the first thing to do is to ascertain, if possible the amount of horse power you are developing each day. If you have a venture meter, you can get the pounds of water evaporated each day, and this can be reduced to horse power. If you are using all steam engines or steam engines for each department, you can ascertain the amount of horse power you are using by use of a steam indicator.

You will find one of these indicators just described in nearly every power plant. The chief engineer also uses these to set their value on the engines. The amount of power also can be ascertained by means of a recording steam flow meter. This is more accurate than the indicator. But the expense of installing is much greater than buying the indicator. If you are using all electric motor, and have recording volt meter on each motor or each department, the amount of power can be easily ascertained. If you are using one motor for two departments, or two machines, first ascertain the amount of power necessary to carry the line shaft with all belts off, then make similar tests for the individual machines and apportioning the power consumed by the shaft over the separate machine in the ratio which each bears to the whole. When you do not have any meters to find out how much horse power you are using, take the horse power rating of each motor.

After you have ascertained the amount of horse power by any of the above methods, multiply the number of horse power in each department by the number of operating hours in that department. A percentage is then established for each process or department in the relation which its H. P. H. bears to the whole.

Lights

Ascertain the watt rating of the lamps used in each department and the number of hours per day they will be used, and reduce the total watt hours to the equivalent of horse power hours.

Heat

Most paper mills use exhaust steam for heating. A recording flow steam meter will give you the amount of steam required to heat the plant. Then this can be divided according to the square inches of radiation, or if you are unable to get this, use cubic feet of each department, taking into consideration the number of windows, doors, construction, thickness of walls, and exposure of the department. Either method can be reduced to horse power.

In making up the overheads, make a separate item of power, including in this depreciation fire and tornado insurance, taxes and interest on capital mentioned above, also boiler, turbine and fly wheel insurance, coal, power and electrical labor, supplies, repairs and chief engineer's salary. Then make a distribution as mentioned above. The superintendent's and other mill salaries, and general mill expense, should be divided according to machine or man hour; supplies, repair and millwrights direct to department where the supplies were used, repairs made and work was actually done; handling and storage of raw material, per pound material; shipping labor and storage of finish product, per pound material. You next have a separate account or item which is called departmental overhead. This consists of depreciation, fire and tornado insurance, taxes and interest on capital, on building mentioned above, also sprinkler insurance. This should be distributed according to operating floor space. This makes up the manufacturing cost.

Administration and Selling

These can be made separate or together. As the selling expense is small in an ordinary coating mill, I would recommend that they be combined. They then will consist of traveling expense, postage, office salaries, advertising, and general office expense. The administration and selling can be included in the total cost, by first getting the manufacturing cost, and then adding administration and selling, by multiplying the manufacturing expense by a fixed per cent. This fixed per cent, of course, will vary according to amount of paper coated and total amount of administration and selling expense.

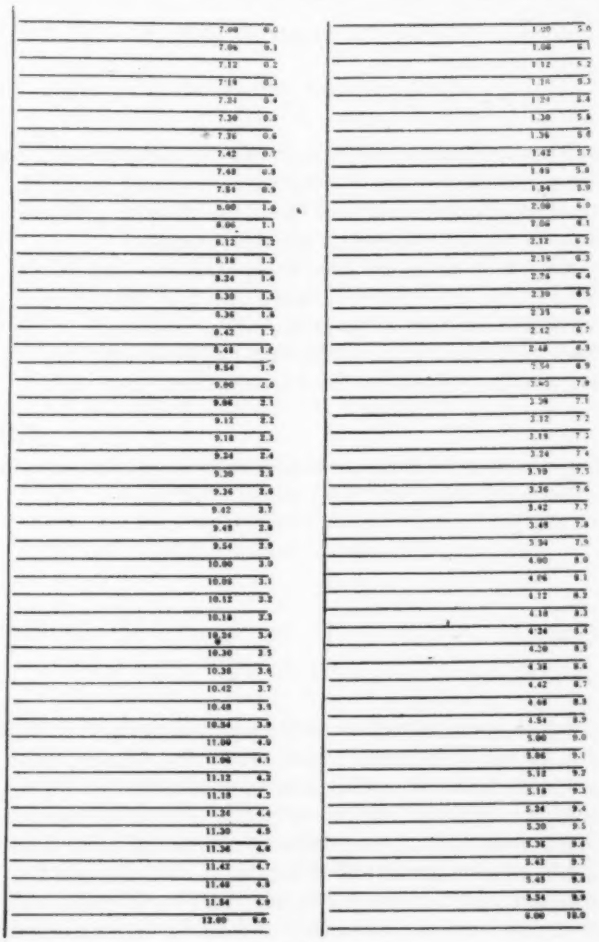
Operation

The amount of casein and alkali used in the casein mixture is weighed into a mixing tank, where the water is made up to a certain mark, and it is dissolved by steam which makes it all nearly the same per cent dry. Next, the mixing tanks are filled; the amount of casein mixture, clay, satin white and water are all weighed into this tank. After mixing, a certain amount is weighed out into each tub. There is a platform report which is made out daily that gives the amount of casein, alkali, satin white and clay used. This report was not used at first, and we tried checking the amount used by the amount on hand plus the amount bought less the inventory. This is also used now at the end of month, but the platform report gives a chance to check each day or week, which makes the records more reliable; also the men are more careful in weighing than before. The colorman makes out a color room report on each order, which gives the amount of material, including color used on each order.

Your next trouble will be to find out the number of tubs used on the order. We have three checks on this; first, the color man marks down the number

SORTING REPORT

NAME_____ DATE_____



Form No. 1

of tubs on each order, he also puts a ticket, giving the order number, on each tub. These tickets are collected in the coating room and turned in with cost reports; also the coating runners keep account of the number of tubs used. This information is on his time card.

The rolls of raw stock are weighed before they are put on the machine, and this weight checked with machine roll weight, and then put on coating runner card; also, a report is turned in from each tour, which gives the weight of raw stock. The rolls are also

weighed after being finished, which gives a check on the amount of paper coated by each man. The calenders and cutting cost are obtained about the same as in a paper mill. We use a "Self-Figuring" Sorting Report (Form No. 1), which saves about thirty or forty minutes per day. The information is all collected on a summary sheet for each mill order, the is always shown on the summary. Dividing the difference between finished weight and raw stock will give the per cent the coating material should be to raw stock. Then the number of pounds of dry coating material, divided by pounds of raw stock, will give you the per cent of coating material and raw raw stock is 96 and finished coated paper is 160 lbs.

COMPARATIVE COST SHEET

COATING MILL

GRADE..... BASIS WEIGHT 25x38"....

Date Finished	Order No.	Total Perfects Finished	Total Seconds Finished	PER HUNDRED POUNDS									Total Order Cost	% of Waste	% of Seconds
				Raw Stock	Coating Material	Coating Labor	Calender Labor	Cutting Labor	Sorting Labor	Trimming Labor	Cases	Total Mfg. Cost			

Form No. 2

front size being used for the current month in which the order was started, and back, for the part of order that is run or finished in the next month.

You will note by the comparative Cost Sheet (Form No. 2), that we figure out the cost of each order for each department per hundred pounds. This is done by use of a calculating machine, and use of reciprocals. We also make a summary sheet (Form stock. For example, suppose the weight per ream of per ream, this would make the coating material 64 lbs. per ream:

$64 \div 96$ would be 66%.

Suppose weight of coating material was 25,539 and raw stock 39,291.

Dividing 25,539 by 39,291 = 65%

One of these being 66% and the other 65%, it would

GRADE

Order No.	Pounds	Material Cost	Labor Cost	Total Cost	Selling Price	Profit Cwt.	Total Profit	Total Order Cost

Form No. 3

No. 3) for each grade which shows the pounds, total cost per hundred, selling price per hundred, profit or loss per hundred, and total profit or loss in dollars. Each month is summarized and total pounds and total profit of each grade added together. We also get the average profit or loss per hundred for each grade, and average cost per hundred. These are summarized together for three month periods. It is very hard at times to determine the exact amount of waste. We first figure up the net weight of each tub, and then dry weight is determined, according to the amount of dry weight in the tub, which is checked by drying out a small amount of the mixture. Nearly the same formula is always used on the same grade, so it does not require a great amount of laboratory work to check these weights. The weights just mentioned plus raw stock equals the amount that went to make up the order. This amount, less the paper finished, equals the waste. The weight per ream of raw stock show you that the coating material was in about the right proportion to raw stock.

There is also another way to ascertain if you have the correct number of tubs. Divide the weight of raw stocks by the weight per ream of raw stocks, and it will give you the number of reams possible. Multiply the difference between the weight per ream of finished paper and weight per ream of raw stock by the number of reams, ascertained above, and you will have the number pounds there should be of coating materials.

For example, suppose the weight of raw stock was 2,493, weight per reams of raw stock 98, you would have enough raw stock for 25 reams.

If the weight of finished paper was 148 lbs. per ream, and 148 less 98 would be 50, then 50×25 would be 1,250 lbs., or weight of the coating material. If the dry weight of the tubs was about 1,250 lbs. you would have the correct number of tubs.

A Machine Tender's Duties in a Box Board Mill

By RICHARD CLAYTON

ALL box board machines, being by no means alike, varying from the big 100-ton daily capacity down to 4- or 5-ton capacity; and there being so very many grades of box board, it would hardly be possible to set down a line of duty that all could observe and follow.

However, though the machines are of various sizes and makes, and box board is of many grades, there are certain duties which will apply readily to all machine tenders.

First of all, a machine tender should take a live interest in his work, in the keeping up of his machine, the quality and quantity of his output,—quality should come first; the quantity will take care of itself.

In starting a machine say, on Monday morning, after the Sunday shutdown, a machine tender should first look carefully over his machine and see to it that all repair and upkeep work of the day before has been properly done and no tools or rubbish left lying around or among the machinery, to cause trouble when starting. Examine the felts carefully; lower press, baby rolls and couch rolls; hook up the levers to the press and baby rolls; place an equal amount of weight on both sides of first press, leaving weights off baby presses until after stock is turned on. Fill vats with water and start the engine, slowly, allowing it to run about one-half speed. Then throw in the clutch of first press, carefully noting if all the rolls and cylinders are turning. If everything is all right, then start second press, and the rest of the machine in order. After the machine is started and everything is right, speed the engine to where it belongs; turn on the stock, the same amount to each cylinder; put weights on baby presses, the heaviest weight being on first pair back of first press, less on the next, etc. When the sheet passes through these baby presses each pair should take out about the same amount of water, and the weights should be so regulated that they will take water from the sheet all the way across. After the stock is turned on, all cylinders should be watched until the proper amount of "suction" shows on each, or sufficient amount of "suction" to make a well-formed sheet. Everything up to this point being all right, put on what additional weight is necessary on the first press, and pass the sheet through the second and third presses, weighting them after the sheet has passed through; then onto the dryers; they having had steam in them for some time should be at the proper temperature.

A machine tender should be able to tell by the time the sheet leaves the third press whether or not it is within a few points of the right thickness. Then as soon as the sheet is over the machine and through the calenders and cutter, he should get small samples from each side and the center of the sheet and caliper them. If the sheet is heavy or light he should then change the stock or speed of machine to make it right.

A machine tender has many duties; his position is a responsible one; he has many things to contend with, but if given good stock his troubles are few, and he will make a good sheet, and the tonnage will go up. If given poor stock, the reverse happens.

I will not go into the manner of preparing stock at this time, except to say that the quality of box board depends on the way the stock is handled in the beaters and jordans, and a larger tonnage can be gotten from quick, well-beaten stock (chip) of the proper mixture than from stock that has been allowed to stay too long in the chests or beaters. Straw board is another story.

I have not mentioned any of the machine tender's helpers in this article, but will take that up another time. I will say, however, that proper help goes a long way to help a machine tender get results.

Best Method of Titrating Bleach

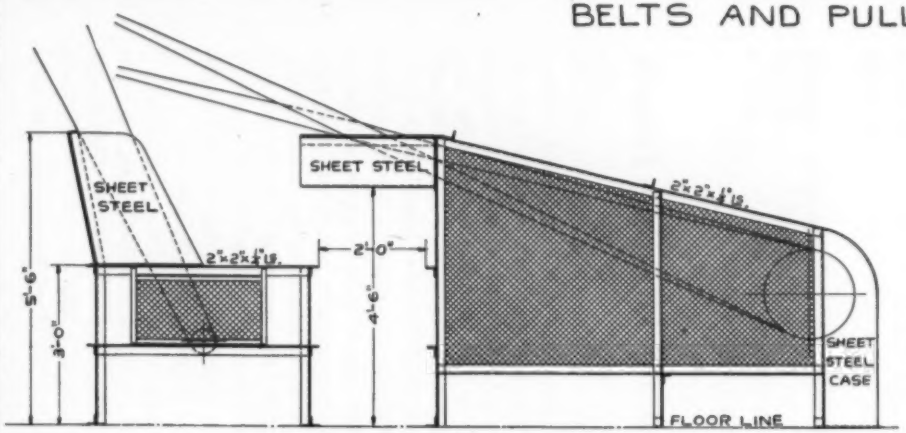
"I WAS much interested in your article in 'The Paper Industry,' on 'The Chemistry of Bleaching.' I am always interested in the exchange of ideas with other workers in these fields and, therefore, am taking the liberty of asking you a few questions on this matter. Do you feel that the arsenite method of titrating bleach is superior to the thiosulphate method? If so, why? We have done considerable work on the comparison of these methods and feel that in the matter of ease of manipulation and possibility of getting pure materials which will give reliable results, there is no comparison between the two, the thiosulphate being far superior. We have also been unable to find any evidence for the statement of Treadwell that the thiosulphate method is complicated by chlorates. Have you tried that?

"J. E. M."

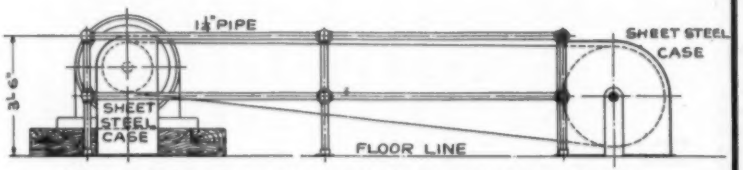
"In reply to your letter of the thirteenth concerning a recent article on 'The Chemistry of Bleaching,' I can state that I am very glad to have the opportunity of answering the questions which you ask.

(*Continued on page 734*)

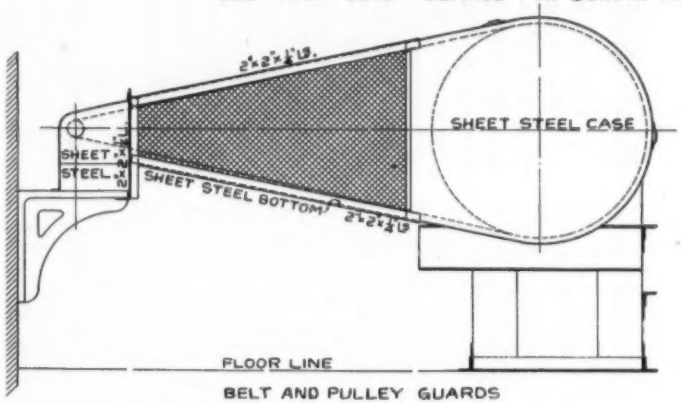
BELTS AND PULLEYS



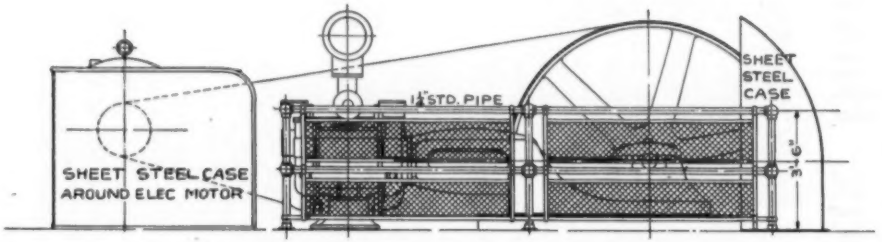
BELT AND PULLEY GUARDS FOR BORING MILL



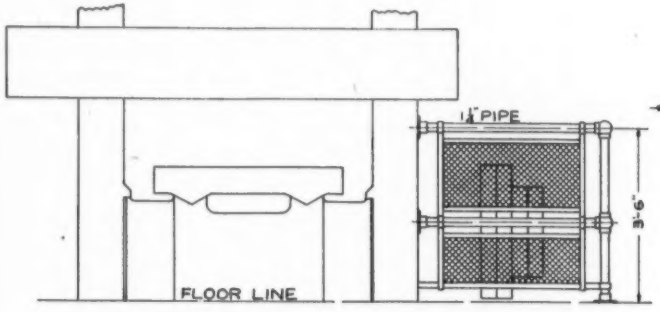
BELT AND PULLEY GUARDS FOR ELECTRIC MOTOR DRIVE



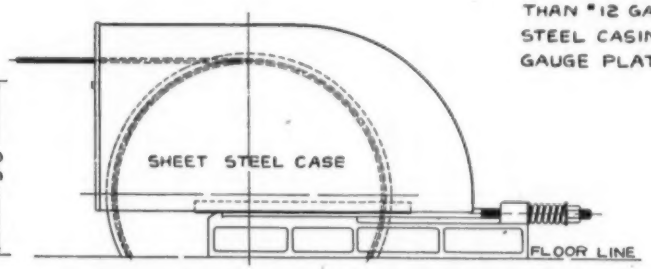
BELT AND PULLEY GUARDS



GUARDS FOR MOTOR DRIVEN AIR COMPRESSOR



PULLEY GUARD FOR IRON PLANING MACHINE



GUARD FOR END SHEAVE OF HOT BED PULL-UP

WIRE NETTING 1½" MESH, WIRE NOT LESS THAN #12 GAUGE.
STEEL CASINGS, NOT LESS THAN #10 GAUGE PLATE.

ILLINOIS STEEL Co.
JAN. 1. 1910.

PLATE-1

Belts and Belt Guards

Prepared by the Engineering Department of the National Safety Council

BELTS must be reckoned among the industrial appliances which have occasioned a great number of serious accidents. Attention cannot be too forcibly called to precautions which should be taken in the management and safe-guarding of these dangerous appliances.

Leather belts are in general use, except in situations where there is an excess of moisture, heat, grit, or other exceptional conditions.

Strength

Engineering manuals indicate a strength of 2,000 to 5,00 pounds per square inch for solid leather belts. This may be reduced at lacing or joint, even if well put together, to about 1,000 to 1,500 pounds.

The ordinary type of belting cannot safely stand a temperature higher than 130 degrees F.

Working Loads

The safe working load may be learned from the manufacturer of the belt and this load should never be exceeded.

Tension

Belts should be adjusted to tension under condition as closey approaching normal as may be devised. In damp or rainy weather, belts are liable to stretch. This fact should be considered in computing tensions in new adjustments.

Countershafts with adjustable hangers are advisable for new installations.

Length

Average distance between shaft pulleys for small belts should not exceed 15′; for larger belts, not to exceed 25′, and for main belts on large pulleys, not to exceed 30′.

Splicing and Lacing

Endless Belts.—A general rule in many large plants reads about as follows: "Endless belts should be used wherever possible; in case endless belts cannot be used (and the circumstances permit), then the belts should be laced with rawhide or leather lacing. Belt hooks or metal lacing should not be used except where absolutely necessary in emergencies."

The objection to the use of metal in joining belts is its probability of presenting sharp projections which will injure hands or catch clothing. For this reason, if such lacing is used at all, special care should be taken to see that it is not used in a situation where the hand or clothing is likely to come into contact with the belt.

Cementing and Splicing.—All authorities agree that splicing and cementing is safer than any other method of joining belts. Claim is also made that belts joined in this manner will wear longer, cut labor cost, do smoother work and give better service.

Ends of belts should be carefully scarfed down, covered with cement, and firmly pressed together. It is essential that the work be carefully done by experienced workmen. The scarfing should be so arranged that the pulley where slipping is more likely to occur (i. e., the smaller pulley), will tend to smooth down the scarf end against which it rubs in the event of a slip, instead of tending to roll this end up.

Vulcanizing, with stepping splice, is recommended for rubber belts.

Lacing.—When the belts are laced, rawhide or leather lacing is recommended. Ends should be cut short down to the belt and care should be exercised to avoid broken turns.

Belts usually weaken and break near the lacing. To avoid weakening belt too much, holes for lacing should be made with oval punch, with the longer diameter parallel to sides of belt. If the width of the belt will permit, edges of holes should not be nearer than ½″ from sides nor less than 1″ from ends. The second row of holes should be staggered and about same distance from first row as first row is from end of belt to be spliced.

Square the ends of the belt, if cut. Start lacing from the center, lacing both sides with equal tightness. Do not cross lacings on side running next to face of pulley. Keep ends of belt exactly in line while splicing.

If practicable, lacing should not be done while the machinery is in motion, and the beltman should be protected against the accidental starting of the machinery, preferably by locking the controlling device. When the line shaft cannot be stopped, special precautions should be taken to prevent the belt coming into contact with the pulley or wrapping on the shaft by the use of a belt perch or other attachment.

Wire Lacing.—The use of rawhide lacing is advocated in preference to metal lacing. The danger from wire lacing arises from two principal sources; the working out of the clinched ends of the wire and the ragged ends produced by a fracture. If the wire lacing must be used, it should be in some form of spiral continuous wire stitch, so that there will be only two clinching points to turn into the leather on each end of the belt, the two lacings being hinged together. Wire lacings, unless machine made, require a high degree of skill. Care should be taken that the wires lie below or flush with belt surface, and not touch on pulley.

PLATE-1
ILLINOIS STEEL CO.
JAN. 1. 1910.

Single wire lacings, without hinge, should be used—if at all—only over large pulleys.

Lacings made of separate wire staples, pressed in, with or without the use of a hinge, are particularly objectionable, because the wearing of the belt on the pulleys tends to throw the clinched ends out. Their extreme sharpness constitutes a particular danger.

Toothed Clinches.—Heavy toothed clinches of the so-called "aligator" type are less dangerous than the wire lace or wire staple type, partly because of their weight and strength, and partly because the clinched ends run on the pulley side. The best types have a double grip.

Rivets.—These connections offer the possibility of ragged ends on the opened rivet.

Link Fasteners.—Certain forms of this type avoid the need of clinching, but they are seldom suitable for better-class use. They are difficult to align and present open joints that may easily catch a garment.

Belt Guards

Overhead Belts.—High Transmission—any portion of an overhead belt which is 7′ or less from the floor, or which must be approached while in motion, should be guarded on the sides and bottom.

Heavy or fast-running belts more than 7′ above the floor, so located that should they break they would endanger persons below, should be guarded underneath. As to what constitutes a heavy or a fast-running belt, opinions vary; some engineers believe that if a belt located as above is 6″ or more in width and the speed is 30′ or more per second, the belt should be guarded. The state of New Jersey requires that belts 6″ or more in width, so located that breakage would endanger persons below, shall be guarded underneath, and that the guards shall extend to the wall or ceiling in such a manner as to retain the belt should it break. The State of Pennsylvania has a similar rule, but places the width of the belt at 10″ or more. The State of Massachusetts requires that overhead belts 12″ or more in width and running 30′ or more per second, located over passageway or working places shall be guarded. Such guards usually are constructed with frames and braces of rolled shapes, with a filler of wire mesh, expanded or perforated metal, or metal lattice.

It is obvious that the guards should be capable of withstanding not only the weight of the belt, but blows or stresses due to the possible entanglement of the belt. Such guards are usually of the hanging type, and should be smooth on the inner surfaces, of a greater width than the belt, and should be brought up around the pulley upon which the belt travels downward, to avoid the broken end whipping around the guard.

Vertical and Inclined Belts.—Low Transmission—all vertical and inclined belts (some authorities except cone-pulley belts and belts 1″ or less in width), should be so guarded that a hand or other part of the body cannot project through, over, around or under the guard and be caught by a moving part. Authorities are pratically unanimous that if the projection be placed 15″ or more from any moving part, a height of 3′ 6″ is sufficient for the guard. When the guard is placed less than 15″ but not less than 6″ from the thing guarded, the heights recommended vary from 5′ to 7′, with the majority in favor of a guard 6′ high, with openings in the filler not greater than 1½″. If the clearance is less than 6″, then the guard should be 6′ high with no opening in the filler larger than ½″.

A guard should not be placed so far from the thing guarded as to invite the workman to get between the guard and the moving parts, or so far as to make it inconvenient to reach bearings, etc., while standing outside the guard. It is recommended that the maximum distance at which a guard be placed from the thing guarded should be 20″. The Council advocates the following safe practices as to heights of guards and sizes of openings in the same:

Distance from Thing Guarded.	Height of Guard.	Size of Openings.
15″ to 20″	3′ 6″	
6″ to 15″	6′ 0″	1½″
0″ to 6″	6′ 0″	½″

When the upper part of a horizontal belt is less than 6′ from the floor level, the belt may well be guarded over the top, instead of carrying the guard up 6′, or a 3′ 6″ railing should be placed at least 15″ and not more than 20″ horizontally from the edge of the belt.

Floor Openings.—When belts pass through a floor (or where any guard is placed around a floor opening), a 6″ solid section or toe-board should be placed at the bottom of the guard to prevent objects rolling or being kicked through the floor opening. Where belts pass through openings in a floor or wall, provision should be made to guard against friction due to the belt rubbing on the edge of the opening. The placing of rollers at the two edges of the belt, so that if the belt rides to one side it will strike the roller and cause less wear and friction, is considered better practice than facing the opening with sheet metal, as is sometimes done.

Construction of Guards.—Metal is preferable to wood in the construction of guards. Wooden guards especially if oil soaked, increase the fire hazard; they also are more expensive in upkeep. Metal guards are practically indestructible, wear better and are more substantial. Where guards are subject to acid fumes, wooden guards may be necessary, however.

All guards should be of rigid and substantial construction. The railing guards, placed from 15″ to 20″ from the moving parts, should be of the double type, with the top rail 3′ 6″ from the floor and an intermediate rail midway between the top rail and the floor.

If constructed of rolled shapes, their section should

be at least equal to that of 1½x1½x3/16" angle iron. When the railings will be subjected to considerable handling or stresses, 2x2x¼" angles, or their equivalent, should be used. If constructed of pipe, they should be not less than 1¼" inside diameter. If constructed of wood, the posts should be not less than 2x4", or their equivalent section, and the rails not less than 7/8x6", or their equivalent section. Uprights in all instances should be spaced not more than 8' centers. Preference is given to railings constructed of rolled shapes, as they are less likely to fail. The use of wood should be avoided where practicable.

Guards consisting of frame work, with mesh or plate filling, will vary as to strength of material used according to the area of the guard.

If the guard is 6' in height and fastened to the floor without other support or bracing the metal frame of the guard should have a section at least equal to that of 1¼x1¼x1/8" angle iron. The filling material is usually attached to an angle frame by means of ¾x1/8" flats, fastened to the angle by 3/16 bolts or rivets, spaced not more than 10" centers, or by 1x1" wooden strips fastened to angle by 3/16" bolts. Perforated or sheet metal should be bolted or riveted directly to the angle, or spot welded. For a pipe frame, a 1¼" open seam tube is recommended with the filler clamped in the seam of the tubing.

When the dimensions of the guard are not more than 3', or where it is braced every 3', the frame should be equivalent in strength to ¾x¾x1/8" angle iron, or ¾" open seam tubing.

Filler.—Filling material should not have openings larger than ½" when the guard is placed within 6" of a moving part, nor larger than 2" (1½" recommended) when more than 6" and less than 15" from the moving part.

When the area of the guard between braces is 4x4' it is recommended that wire mesh be at least No. 12 U. S. gauge, 1½" mesh or perforated or sheet metal of at least No. 14 gauge, but 10 gauge is recommended.

No. 16 gauge, perforated or sheet metal, will make a substantial filler when the area between stiffeners does not exceed 3x3'.

The filler used for smaller areas may be of smaller gauge metal, but a gauge smaller than 18 should not be used because lighter weight guards have a short life.

All guards should be substantially fastened in place, and, where it is necessary to have access to machinery, portions of the guard should be arranged to swing or slide.

All sharp edges of filler should be protected, and, where hand holes are provided, the edges should be reinforced by at least No. 24 gauge sheet metal, but No. 18 gauge is recommended. When a gate or door is required, it is recommended that the frame be at least equal to 1x5/8x1/8" angle, and that means be provided to hold it securely in place.

Design of Guards.—Care should be exercised in design of guards to provide convenient access to parts which must be repaired or maintained. This may be done by making the guards movable or by providing doors or removable panels.

National Chemical Exposition

With accepted applications for space near the 400 mark, a new record, the preliminary details of the Sixth National Exposition of Chemical Industries in Grand Central Palace, New York City, September 20 to 25, inclusive, make certain that the show will outclass the five previous ones. The program aside from the exhibition proper, is also the biggest that has ever been scheduled.

On the afternoon of Thursday, September 23, the chemical Engineering symposium will take place. The American Institute of Chemical Engineers will hold a meeting in the Palace, in the afternoon, and papers of great interest will be read. In the evening the engineers will have a dinner at the Technology Club.

Three other symposiums will be held during the week. One will be on Fuel Economy, one on Materials Handling, and one on Industrial Management. The Fuel Handling Division and the Material Handling Division have developed such progress that it is necessary to give each a separate section at the coming exposition. Important topics will be discussed on the days these two divisions meet.

Entering, as it does, practically every phase of industry, the exposition offers a remarkable opportunity to the manufacturer and business man to see what has been accomplished since American chemists entered the field in earnest. Discoveries that have revolutionized many manufacturing processes have been made. These have increased production and improved the quality of the merchandise and have resulted in those who have spent money to aid research, finding that the investment paid.

A feature of this year's exposition will be moving pictures. These will prove how American chemistry has advanced and the subjects will be placed before the public in a manner that will enable the veriest novice to understand the difficulties that have been overcome during the past five years.

Research and experiments during the past five years, though successful to a wonderful degree, have proved that despite all that has been accomplished, there is still a big field to be explored in dyes, pharmaceuticals and various organic products. American chemists are rapidly solving these problems, but they have no easy task. However, the United States has reached out and grasped the highest pinnacle obtainable in world chemistry and its chemists are determined that it will never again relinquish its position.

Program of T. A. P. P. I. Fall Meeting

THE program of the Fall meeting of the Technical Association of the Pulp and Paper Industry to be held at Saratoga Springs, N. Y., September 1-3, 1920, has been definitely completed, and there remains now to be issued only certain folders and announcements of the local committee of arrangements. The meeting promises to be one of the best conventions in the history of the association and a record-breaking attendance of members is looked for. It is the first time that the association has met in the Hudson Valley mill region, which is easily accessible by way of Albany, N. Y., from all parts of the country.

Committee of Arrangements

The following are the addresses of the Local Committee on Arrangements:

Charles F. Rhodes, Chairman; International Paper Company, Glens Falls, N. Y.

George S. Witham, Jr., in charge of Transportation and Printing; Union Bag and Paper Corporation, Hudson Falls, N. Y.

C. A. Woodcock, Treasurer of the Committee; Finch, Pruyn & Co., Glens Falls, N. Y.

Archie J. Kennedy, in charge of Banquet; Sandy Hill Iron and Brass Works, Hudson Falls, N. Y.

Frank T. E. Sisson, in charge of Banquet Entertainment; Racquette River Paper Co., Potsdam, N. Y.

Sanford M. Hall, in charge of Hotel Reservations and Seeing Saratoga; American Pulp Stone Company, 596 Broadway, Saratoga Springs, N. Y.

Order of Meetings

Wednesday, September 1, is to be given up to the reading and discussion of technical papers and reports, followed by a banquet in the evening. The Chairman of the Banquet Entertainment Committee has been at work for some time on the elaboration of special features in the way of entertainment and some agreeable surprises are in store for members and guests. The proceedings at the banquet will be directed by Mr. C. R. McMillen, Vice-President of the Union Bag and Paper Corporation, who will act as Toastmaster. The speakers will include Mr. Philip T. Dodge, President of the International Paper Company; George W. Sisson, Jr., President of the American Paper & Pulp Association; George R. Salisbury, Justice, New York State Supreme Court, Saratoga Springs, N. Y.; Judge Charles F. Moore, formerly of the West Virginia Circuit Court, New York, N. Y.

The remaining days of the meeting will be given over to mill visitations.

Opening Sitting

Wednesday, September 1, 1920

8:00 A. M.-10:00 A. M.—Registration at Grand Union Hotel.

10:00 A. M.—Technical session will convene at the Casino in park opposite hotel headquarters. After the association has been welcomed to Saratoga Springs by the Mayor of the city, response will be made for the association by Mr. George S. Witham, Sr., Manager of Mills, Union Bag and Paper Corporation.

Committee Reports

Raymond S. Hatch will call the meeting to order, when the customary committee reports will be presented, including those of the following standing committees:

Abstracts of Literature—Ross Campbell, Chairman.

Bibliography—Clarence J. West, Chairman.

Coated and Processed Papers—Clarke Marion, Chairman.

Groundwood—William A. Kelly, Chairman.

Heat, Light and Power—Howard S. Taylor, Chairman.

Joint Committee on Testing Moisture in Pulp—E. C. Tucker, Chairman.

Paper Testing—Frederick C. Clark, Chairman.

Soda Pulp—George K. Spence, Chairman.

Standard Methods of Testing Materials—E. C. Tucker, Chairman.

Sulphate Pulp—Carl Moe, Chairman.

Sulphite Pulp—W. E. Byron Baker, Chairman.

Vocational Education—George E. Williamson, Chairman.

Special Papers

Among the special papers of technical interest to be presented and discussed at the opening sittings of the association on Wednesday are the following:

Quick Method of Determining the Presence of Sulphate Fibre in Paper, by R. E. Lofton and M. F. Merritt.

New Felt Cleaning Device as a Means of Increasing Production, by G. A. Woodcock.

Boiler Room Efficiency Increased by a New Mercury Boiler, by W. L. R. Emmett.

A Continuous Mixing System for Newsprint Mills, by C. H. Allen.

Automatic Cooking Control for Sulphite Digesters, by E. J. Trimbey.

Preliminary Report for a New Method of Testing Lime and Cement Bags, by P. L. Houston.

Curtailing Bleach Consumption by Adding Sulphur to Digestor Liquor, by George K. Spence.

Discussion of Substitutes for Alum and Rosin in Sizing Papers, led by W. E. Byron Baker and Max Cline.

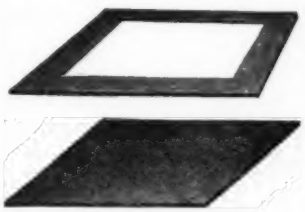
Adjournment for Group Picture and Luncheon

12:00 M.—Adjournment for group picture of mem-

(Continued on page 732)

Rubber Goods for the Paper Industry

Rainbow Packing



Screen Diaphragms

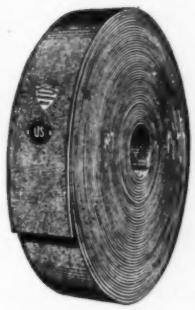
Rubber Covered Rolls

Rainbow Machine Hose

THE paper trade salesmen and the practical factory men of the United States Rubber Company are qualified through study and experience to recommend the right mechanical rubber goods for any condition existing in this industry.

They are ready to assist paper-mill operators by advising as to the best application of mechanical rubber goods in order that the greatest possible service may be obtained for every dollar invested.

Take advantage of this Company's facilities and experience when in the market for mechanical rubber goods. Through our nearest Branch you can obtain the fullest co-operation of our organization.



Rainbow Belt

Cotton Rubber Lined Fire Hose

Deckle Straps

Rainbow Steam Hose

United States Rubber Company

The World's Largest and Most Experienced Manufacturer of Mechanical Rubber Goods

BELTING	HOSE	PACKINGS	MISCELLANEOUS
Transmission *"Rainbow," "Pilot" "Shawmut"—"Giant Stitched"* **Conveyor** *"United States," "Grainster"* **Elevator** *"Matchless" "Granite," "Grainster"* **Tractor** *"Sawyer Canvas" "Little Giant Canvas"* **Agricultural** *"Rainbow," "Bengal" "Grainster," "Sawyer Canvas"*	**Air** *"4810," "Dexter"* **Steam** *"Rainbow," "Giant," "Perfected"* **Water** *"Rainbow," "Mogul," "Perfected"* **Suction** *"Amazon," "Giant"* **Garden** *"Rainbow," "Mogul," "Lakeside"* Also Hose for Acetylene, Oxygen, Acid, Air Drill, Auto Radiator, Car Heating, Air Brake, Gasoline, Oil, Hydraulic, Chemical, Coke, Creamery, Discharge, Vacuum, Sand Blast, Spray, etc.	**Sheet** *"Rainbow," "Vanda," "Paramo"* **Rod** *"Wizard," "Rainbesto," "Peerless," "Honest John," "No. 573" and hundreds of other styles in coils, rings, gaskets and diaphragms—* **Usco Valves—** THE RIGHT PACKING IN THE RIGHT PLACE	**Mats, Matting and Flooring, Plumbers' Specialties, Rubber Covered Rolls, Friction Tape, Splicing Compd., Dredging Sleeves, Hard Rubber Goods, Printers' Blankets, Tubing, Soles, Heels, Jar Rubbers, Moulded Goods**

UNITED STATES RUBBER COMPANY
US
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

Reduce Trucking Costs

Necessity—so often the cause for the development of new methods, has made great demands for increasing factory trucking efficiency in all lines of industry. Systems and standards have been created in an endeavor to satisfy the needs or demands of American manufacturers. Trucking problems are many and varied. The handling of raw materials and of finished products in factories, warehouses, terminals, etc., were great problems. As the railroads and steamships carry the strength and life of the nation, just so the trucking system is the life of the factory or warehouse.

Lift trucks have come to be recognized as one of the foremost improvements of the age. Light loads, heavy loads, unusual loads—all are trucked on lift trucks with equal facility and economy of time and man-power. Whatever your load, whatever its character or capacity, there is a lift truck to move it speedily, easily and economically. This method of factory transportation has reduced trucking costs to a minimum, permitting a saving of 80 per cent in labor alone, since one man with the lift truck can do the same work formerly requiring five men with ordinary hand trucks.

Lift trucks are used in conjunction with platforms. These are very inexpensive, and can be constructed by any workman. Each of these platforms is equivalent to a four-wheel truck costing approximately $40.00 each. Platforms when not in use are stocked ceiling high in some off corner of the building, thus permitting valuable floor space to be utilized for more productive work.

Many prominent concerns throughout the country have already adopted and standardized on this system of trucking. It has proved to be very economical in every respect.

Water Pumping System at Alton Mill

The Alton Box Board & Paper Company at Federal, Illinois, have a 100-ton mill, manufacturing straw and paper box board, and is considered a fine and up-to-date plant.

This plant secures its water supply from tubular wells and uses 2½ million gallons of water per 24 hours.

When this plant was built they put down a number of 8-inch and 10-inch tubular wells, equipping the

same with brass strainers, the depth of the wells varying from 65 to 110 feet in depth. A coarse gravel bed surrounds the brass strainer and the water, which is inexhaustible, raising to within 30 feet of the surface of the ground.

In November, 1913, the company having been unable to secure enough water for operating their plant to full capacity, ordered an 8-inch deep well propeller pump to replace the air lift system they had been using in one of their 10-inch wells. This pump was installed and started up in December following, 60 feet of pump fittings being inserted in the well, and the pump being equipped and operated with a 25-horsepower vertical motor operating at 1,200 r. p. m.

The result of the test showed that nearly 600 gal-

Modern Pulp and Paper Making

A Practical Book for Paper Makers

By G. S. WITHAM, SR.

The first practical book by an acknowledged authority on the manufacture of pulp and paper as it is carried on in America today.

A Few Things the Book Tells:

The properties of the principal woods and other raw materials used for paper.

The qualities, grades and requirements of all the different varieties of paper.

How a Fourdrinier machine is built and operated—in great detail.

What happens to the fibres in the beater.

How to make good ground wood economically.

How to cook sulphite pulp and make and reclaim acid.

The use of clay, size, alum, colors, etc.

How much power is required for every piece of equipment in a pulp and paper mill.

How to install a system of tests and records to keep production up to standard.

Actual complete specifications for Fourdrinier machines, beaters, Jordan engines, grinders.

All the newer developments in paper mill engineering and equipment such as suction couch and press rolls, individual electric drive for Fourdrinier machines, waste paper utilization, electric regulators for grinders, automatic dryer temperature control, weaving devices, Claflin engines, save-all installations, etc.

How to put on a new wire.

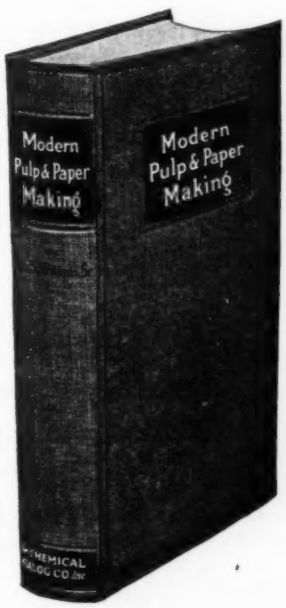
How to care for wet felts, dryer felts, deckles, etc.

How to start up a Fourdrinier machine.

How to install and operate a saw-mill.

How to detect the causes of breaks and defects and how to remedy them.

How to calculate the retention of clay, etc., etc.



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Each piece of equipment is described in detail. Minute instructions for operating every machine. More than 200 illustrations from photographs, charts and diagrams. A complete, practical, treatise on pulp and paper manufacture from the saw-mill to the finishing room. Written in simple, plain language by a man who has gone through the very experiences you are going through—or will go through—to reach the top.

Book Department

The CHEMICAL CATALOG COMPANY, *Inc.*

Publishers of the Chemical Engineering Catalog

MADISON AVENUE, NEW YORK, U. S. A.

This space reserved for

Gregg Pump Co.

KANSAS CITY

Manufacturers of

Gregg Propeller Pumps

For TUBULAR WELLS
For WATER SUPPLY
For PAPER MILLS
and other industries

If you are short of water or want an improved and up-to-date deep well pump

WRITE US

New Sand Filter

A SPECIAL filter for paper mills, producing all the results the paper manufacturer desires. It is a modification of the well known Hungerford filter adapted to paper mill use. It is constructed of concrete, strictly wrought iron pipe, brass strainers and especially prepared silica sand. It is as durable and efficient as can be built at any cost. It can be sold at a very low figure.

This filter gives perfectly clear water, washes thoroughly, does not require renewal of the sand bed, is absolutely reliable in the performance of its duty and requires a minimum amount of attention.

Send for full particulars

Hungerford & Terry, Inc.
PHILADELPHIA, PA.

lons of water per minute was secured from this well continuously, with a power consumption of less than 20 H. P., and the results of this test were so satisfactory that three more pumps were ordered and installed the following year. Three of these pumps are usually used, one pump being held in reserve, and they are now able to secure more water from three wells with the propeller pumps than they formally secured from eleven wells operated with the air lift system, and we understand that they have since taken up seven of their wells and salvaged the well casing, brass strainers and air lifts.

The disadvantage found in using suction pumps, or the air lift system in tubular wells, is that the draw down of water works against this type of pumping machinery, with the result that the flow of water steadily falls off, and, oftentimes, wells are condemned and abandoned, when in reality they are found to be good producing wells when equipped with a propeller system, by the use of which all of the water available in the well is pumped out, and oftentimes three to five times as much water is delivered from a tubular well by using this system of pumping, than can be obtained by the use of any other known system, and at a very much lower cost of pumping and maintenance.

A Non-Freezing Fire Extinguisher

A very serious objection to the ordinary type of hand fire extinguisher is that the contents will freeze at a temperature slightly below the freezing point of water. A frozen extinguisher is not only useless, but

in many cases the extinguisher shell is permanently damaged, or so weakened that a serious explosion may result when the machine is discharged.

The extinguisher illustrated herewith overcomes every objection which is encountered in trying to convert the ordinary hand extinguisher into a non-

Increase in Advertising Rates of The Paper Industry

OUR printers inform us that the price which they have been charging us for getting out this publication will be again advanced. This makes the sixth or seventh advance since April, '19, and this, together with the great advances in the cost of paper and everything else that goes into the turning out of a trade publication, makes it necessary for us to make the second advance since April, '19.

We have borne the burdens of these increasing costs to the best of our ability, but now that these burdens are to be further increased, we find it necessary to advise that rates for space in The Paper Industry after October 1 will be as follows:

Page, 3 months or less, $60.00 a month.	
Page, more than 3 times, based on	$660 per year
Half page, 3 months or less, $35 a month.	
Half page, more than 3 months, based on	$385 per year
Quarter page, 3 months or less, $20 a month.	
Quarter page, more than 3 months, based on	$216 per year
Eighth page, 3 months or less, $12 a month.	
Eighth page, more than 3 months, based on	$120 per year
Sixteenth page, $8 a month; if more than 3 mos. based on	$75 per year

This new yearly rate is extremely low for the service rendered. It is well known that a page in a good monthly is of as much or more value than a page in a weekly, though the latter comes four times as often, for the weekly is glanced over hurriedly and then thrown away, while an educational monthly is read time and time again, and then filed for further reading or reference.

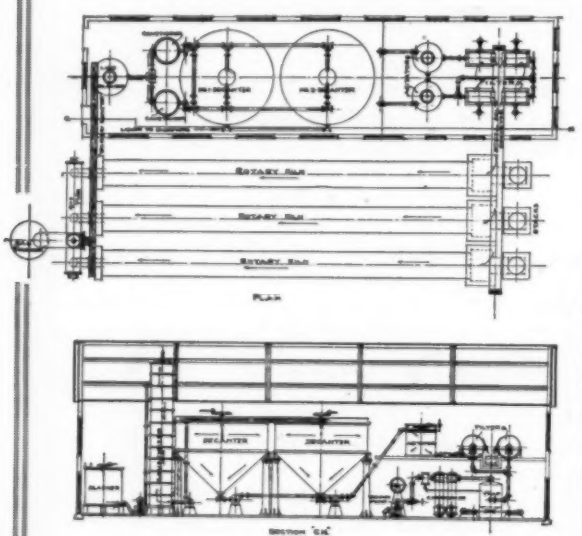
To cover the great pulp and paper making industry all the year 'round with a page announcement for $660 is an exceptional opportunity for anyone who has anything to sell to this great industry.

THE PAPER INDUSTRY,
356 Monadnock Block,
Chicago.

Continuous Causticizing with Lime Recovery and Reuse

OUR apparatus is built for the specific purposes indicated in the above title. It is the work of our consulting engineer, who for nearly twenty-five years was general manager and chief designing engineer of one of the large alkali plants in this country. The apparatus has been in successful operation for some seven years, and is highly efficient, both as regards economy in the use of raw material, and saving in labor.

The complete plant which we furnish, consists, as indicated in the sketch, of a continuous causticizer, decanter, rotary filter, rotary kiln, gas producer, lime slaker and auxiliary apparatus such as vacuum pump, lime and liquor pumps and sludge agitator. All apparatus work continuously. The causticizer is heated with exhaust steam, and supplied continuously, by means of pumps, with calcium hydrate and sodium



carbonate in the proper proportions. The continuous discharge of caustic liquor and lime sludge is delivered by pumps to the decanters, the clear caustic drawn from the top and the mud from the bottom; delivered by pump direct to the sludge agitator from whence it flows to the filters. The dried filter cake is delivered by belt to rotary kilns fired with gas, from whence the recovered lime is returned to the slaker to be used again.

With good grade of lime, 90% of the sludge can be recovered. The alkali loss is with careful working, almost nil. All of the apparatus is of heavy construction, and specially designed for the work. The process being continuous the steam consumption is much less than that of the batch process, moreover the process does not require live steam, exhaust at 10 pounds pressure being ample to operate at maximum capacity.

Glamorgan Pipe & Foundry Co.

Lynchburg, Va., U. S. A.

freezing type. It was found necessary to work out an entirely different design and this result was obtained only after long study and experiment.

The extinguisher is charged with about ten pounds of calcium chloride dissolved in two gallons of water, a highly effective fire quenching solution. This liquid will not freeze at 30 degrees below zero. The expelling force consists of three ounces of liquid carbonic acid gas, contained in a steel bottle held in the head of the extinguisher. This bottle, or cartridge, is tested to withstand 6,000 pounds pressure.

A stem extending out through the top of the extinguisher is in contact with a thin metal seal on the gas bottle. When struck sharply with the hand this plunger pierces the metal seal and releases the gas which immediately generates a pressure sufficient to throw a powerful stream from the extinguisher a distance of fifty feet. This carbonic acid gas is an extinguishing agent, in itself fully as effective as the calcium chloride solution. None of these ingredients is in any way harmful to anything except fire.

It is protected from accidental discharge by a swinging bracket which makes it impossible to strike the plunger until the extinguisher has been lifted from the bracket.

Glens Falls Exhibit at Chemical Show

The Glens Falls Machine Works will occupy space No. 32 at the coming Sixth National Exposition of Chemical Industries, Grand Central Palace, New York City, week of September 20th, where they will demonstrate their Rotary Sulphur Burner, which is used successfully in the manufacture of $S O_2$ for the production of sulphurous and sulphuric acid. Its usefulness is demonstrated in many industries, among which are sulphite pulp, sulphuric acid, copper leaching, bleaching of grains, liquid sulphur dioxide, sugar refining and extraction of fats from tankage.

The 30 in. Sulphur Burner will be shown in operation, this size having never been demonstrated before.

Another exhibit will be a model of a Knot and Sliver Screen, designed and recently patented by H. D. Wells of their engineering department. This machine is a new addition to their line of machinery and is now ready to be marketed. It is for use on either chemical or mechanical pulp and operates equally well on both. It performs its operation on chemical pulp as the pulp passes from the blow pits or diffusers to the screens, and its operation on mechanical pulp as the pulp passes from the grinders to the screens. It has a large capacity capable of screening 60 tons of chemical pulp in 24 hours and an equal tonnage of mechanical pulp. It does this work consuming only one horse power of energy.

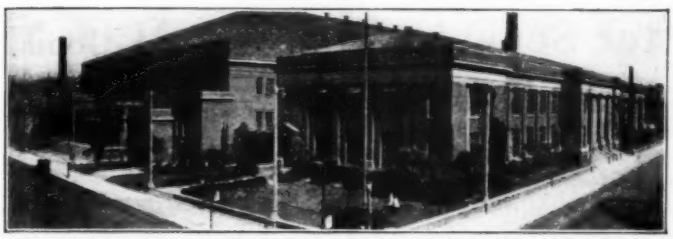
The booth will be in charge of Mr. Harold D. Wells

"BACK TO MILWAUKEE"

Ninth

Annual Safety Congress

SEPT. 27 TO OCT. 2, 1920



Since Milwaukee was the scene of the First Congress, it is fitting that this splendid convention hall—the MILWAUKEE AUDITORIUM—should house the entire activity of the Ninth Congress

From the standpoint of achievement the Annual Safety Congress ranks as one of the most important conventions held in America.

Five thousand men and women, actively engaged in preventing the useless sacrifice of human life from accidental causes, will attend the Ninth Congress.

One hundred and seventy-five speakers—men of national reputation — specialists representing every phase of safety and industrial betterment work will address the various meetings. The experiences of the past year will be reviewed, and a new and more intensive program developed for the coming year.

"The Annual Safety Show"—covering 46,000 square feet of floor space—will present under one roof a thoroughly comprehensive display of *up-to-date* appliances and equipment for safeguarding the health and lives of workers.

If you intend to exhibit at the "Safety Show" your reservation for space should be in now. Even 46,000 square feet does not last long when it is being sold in "quarter-sections."

Every convenience for the operation of machines and equipment has been arranged for—water, steam and electricity.

For detailed information write

W. H. FRATER, *Business Manager*

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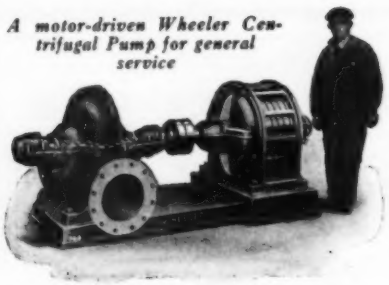

A motor-driven Wheeler Centrifugal Pump for general service

WHEELER
Centrifugal Pumps Give Better Service

THEY are designed along compact, substantial lines. The casing is of the horizontally divided type. This is the most accessible form of construction for inspection or repairs of the moving parts, without disturbing pipe connections. The impeller is secured to a shaft of forged nickeled steel, and accurately balanced both statically and dynamically. Being of the enclosed double suction type, the impeller is hydraulically balanced. But to absorb momentary stress from any source, a ring-oiled thrust bearing is located in the outboard bracket. Such construction refinements as these insure a smoothly running pumping unit.

The high efficiency of Wheeler centrifugal pumps guarantees minimum operating cost. There are no valves or other complicated parts to get out of order. With but a single moving element, the impeller, they can be cared for by unskilled labor.

Our engineering department is at your service for advising what are the vital points to be considered when selecting a pumping unit for better service.

Send for Catalog 108-B

Wheeler Condenser & Engineering Co.

CARTERET NEW JERSEY

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New York
Boston
Philadelphia
Pittsburgh
San Francisco
Los Angeles
Salt Lake City
Denver
Seattle
Chicago
Cincinnati
Atlanta
New Orleans

101

and Fred S. Chaffee, both of whom are men of experience and well versed in the manufacture of SO_2 and paper pulp. They will be pleased to give any information desired.

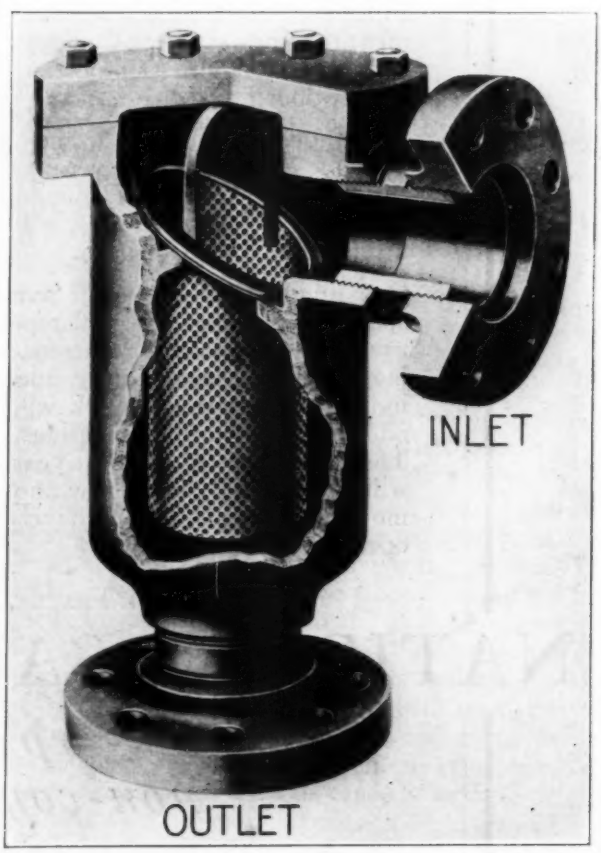
The Pulp and Paper Trading Company, of 21 East Fortieth street, New York, has added a clay department, with R. R. Ross, for many years in the papermakers' clay line and widely known among mills, in charge. The company has good sources of supply among clay mines in the South.

If the price of paper goes any higher, shoe manufacturers are liable to substitute leather for paper in the manufacture of shoes.

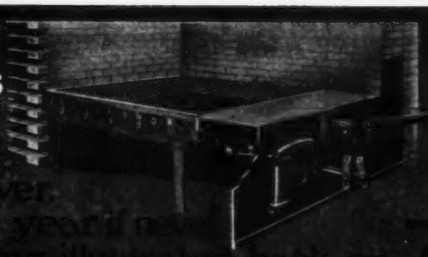
A Good Strainer

Strainers are required on the suction and discharge lines of lubricating oil, fuel oil and quenching oil systems, for the removal of solid foreign material in suspension. Also, power plants which secure their raw water supply from such sources as rivers or lakes, require strainers to prevent weeds, stocks, marine plants and small fish from entering pipe lines.

For this purpose, the strainer shown in the accompanying illustration has been placed on the market. The body is constructed of cast iron and the strainer



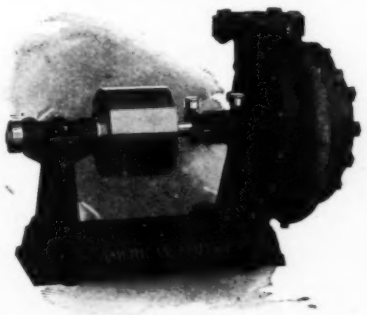
AJAX
Rocking Grates



15% Less Coal
an increased steam
capacity and
lower maintenance
and labor costs -

VALLEY IRON WORKS
WILLIAMSPORT PENNA.

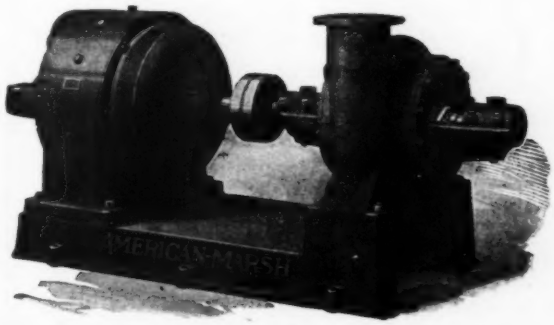
AMERICAN-MARSH
Centrifugal Pumps
BELT OR MOTOR DRIVEN



Extra wide ring oiled bearings. Overhanging casing allowing the discharge to be taken at any angle desired. Removable outer head so that impeller may be withdrawn without disturbing the casing. Hydraulically balanced impeller insuring minimum end thrust. Impeller machined all over and turned to make a close running fit with the casing.

Finished with open runner for handling paper stock.

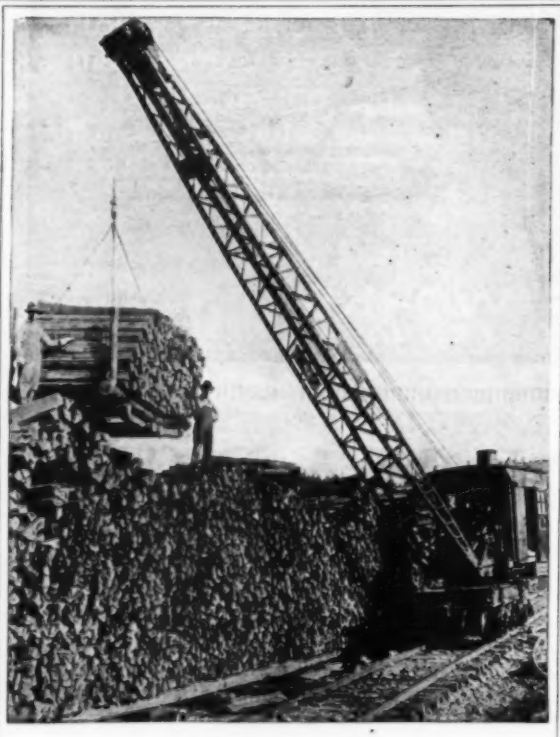
INVESTIGATE. *ASK FOR BULLETIN No. 25.*
Furnished Promptly Upon Request.



We Also Manufacture **Power Pumps, Deep Well Pumps, Boiler Feed Pumps, Vacuum Pumps, Horizontal Power Air Compressors.**

American Steam Pump Co.
Battle Creek, Michigan
Chicago Office, 1220 Monadnock Block.
New York Office, Whitehall Building, 17 Battery Place.

WE-FU-GO AND SCAIFE
WATER
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES
WM. B. SCAIFE & SONS CO., PITTSBURGH, PA.



BROWNHOIST

Handling Materials at the Mill

IS YOURS one of the many mills which handles considerable pulp? Some of these have found it to be more rapid and economical to do this handling with a Brownhoist locomotive crane. A Brownhoist will not only place the pulp wherever it is needed, but will handle your coal, switch the cars and take care of innumerable jobs which come up around the yard. If you have much handling to do, our long crane experience should be of use to you. We will gladly give you any information for the asking.

The
Brown Hoisting Machinery Co.
CLEVELAND, OHIO, U.S.A.

Engineers and Manufacturers of Heavy Dock Machinery, Bridge Cranes, etc., as well as smaller Cranes and Hoists

Branch Offices in New York, Pittsburgh, Chicago and San Francisco.

basket of perforated sheet steel, and lined with wire mesh when strainer is to be used on an oil line.

The strainer is of the single type and may be installed either as a single unit or as the strainer set. This strainer set consists of two of these strainers connected, complete, including two three-way valves and necessary connecting elbows, unions and nipples. The set permits the cleaning of either of the two units without interruption of the service.

Baby Lumber Jacks

Baby lumber jacks, cutting for conversion into news print paper, a 300-year old spruce, is the story told by a picture of Almeron and Roland Berlanger doing together the work of one grown lumber jack.

Almeron is 11 years old, and Roland 9, but the two help their father cut spruce for a great paper mill company in the spruce forests on Cranberry Lake.

"Sure, these kids work, just like a man, they do

the work every day in the summer of one grown man," said their father.

The age of the tree was determined at 300 years by sophomore students of the New York State College of Forestry at Syracuse, who were on a field trip studying logging operations.

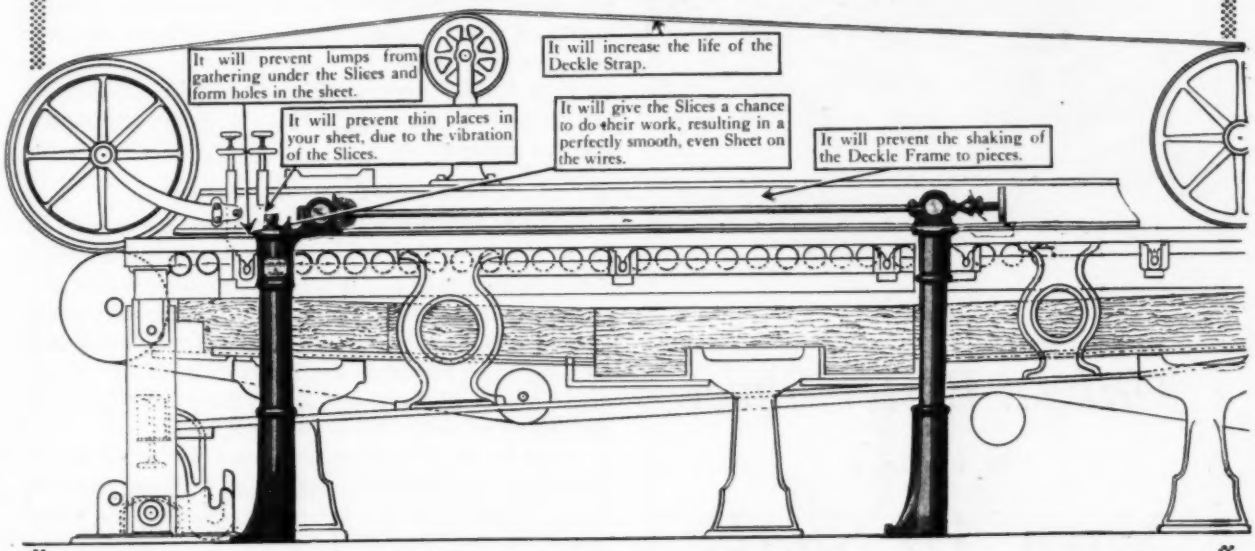
A rough measurement of the tree was taken, and it was estimated that this tree would suffice to make about 800 pounds of news print paper. At the rate of about eight 8-page newspapers to the pound, this 300-year-old tree would suffer to provide only one day's stock for many of America's small daily newspapers.

This rapid disappearance of the raw material is what has led the nation's paper manufacturers to place themselves on record as favoring a national reforestation policy, for the planting of trees to replace those used in industry, and to conserve and protect those still standing.

A Chinese trust controls the dye used on firecrackers, made from cibucao, a Philippine wood. The same dye is used for sealing wax and Chinese ink.

The Acme Deckle Frame Support

"is indispensable to the making of Good paper"


It will prevent lumps from gathering under the Slices and form holes in the sheet.
It will increase the life of the Deckle Strap.
It will prevent thin places in your sheet, due to the vibration of the Slices.
It will give the Slices a chance to do their work, resulting in a perfectly smooth, even Sheet on the wires.
It will prevent the shaking of the Deckle Frame to pieces.

It will make better edge, save breaks and take less power.

Manufactured and Distributed by

HUBAND & NASH

Menasha, Wis.

Most of the best mills in this country are equipped with this device.

Interlake Pulp & Paper Co., Appleton, Wis.

AUTO-CRANE

BECKWITH PATENTS

Always on the Go

BYERS Auto-Cranes are constantly finding new important jobs for themselves. This one, equipped with special bucket, is busy unloading pulp-wood in big "snatches".

A few simple changes and the versatile Auto-Crane is ready to save time, money and man-power on hundreds of jobs around your mill yard. Unloads, stores and re-handles coal with clamshell; excavates with drag-scraper; speeds countless hook, skip and magnet jobs. Three standard mountings; steam, "gas" or electrically-operated.

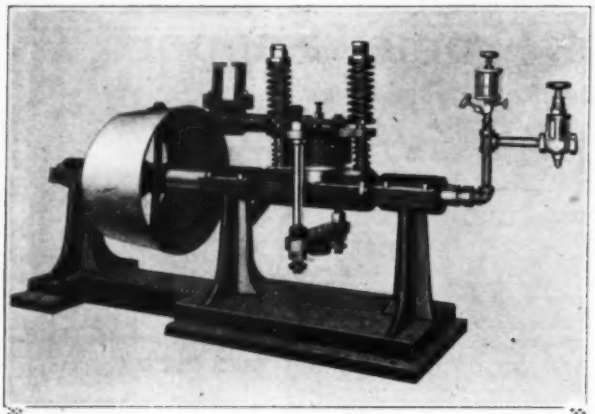
The Auto-Crane wins in speed, dependability, versatility and economy. Manufacturers everywhere have "taken to" this husky unit in a way that justifies the Byers policy of side-tracking 35 years of success with other lines to center production on the Auto-Crane.

We will gladly mail attractive literature and interesting data on request

The John F. Byers Machine Co.

311 Sycamore Street, RAVENNA, OHIO

Sales Representatives in 25 Leading Cities



Make a Better Sheet

By installing a

Nash Air Shake

on your

Fourdrinier Machine

These are the possibilities, all of which mean a better sheet and a larger profit:

1. As near a continuous motion as can be made.
2. Soft and uniform throw.
3. Will not buckle the tube rolls from the jar.
4. It will carry a larger percent of filler by a more dense sheet.
5. A smoother and more uniform sheet of paper obtained.
6. Can be adjusted while in motion to suit the condition of the stock without any waste of paper.
7. It is easy on the machinery and neat in appearance and is worth investigating.

For further information, write

WILLIAM C. NASH

NEENAH, WIS.

Program of T. A. P. P. I. Meeting

(*Continued from page 720*)

bers and guests in attendance, followed by luncheon. (Members being accommodated at Saratoga Springs hotels on the American plan, a special luncheon has not been provided.)

2:00 P. M.—Reconvening of technical sittings at the Casino for the continuation of scientific papers and discussions.

Sightseeing Trip in Saratoga

4:00 P. M.—Adjournment for Seeing Saratoga trip. Members who come to Saratoga in automobiles will be expected to assist with their cars. Wives and guests of members are invited. The trip will cover the Springs, Reforestation Nursery, Yaddo, the beautiful summer estate of the Trask family, one of the show places of Saratoga, and other attractions of the Queen of American Watering Places.

7:00 P. M.—Banquet at Grand Union Hotel as guests of the paper manufacturers of the Hudson River Valley. Toastmaster and speakers as noted above.

Mill Visitations

Thursday, September 2, 1920

9:00 A. M.—The autos will leave the Grand Union Hotel promptly for optional visits to the Hudson River mill of the International Paper Company at Corinth, or Finch, Pruyn & Company mill at Glens Falls.

12:30 P. M.—Luncheon at Parish House, Glens Falls, as guests of Local Committee and the Hudson River paper manufacturers.

2:00 P. M.—Automobile trip to Hudson Falls for visit to Fenimore mill and bag factory of the Union Bag and Paper Corporation, Standard Wall Paper Company and Sandy Hill Iron and Brass Works.

A Steamboat Ride on Lake George

5:30 P. M.—Leave Hudson Falls promptly for automobile ride to Lake George and along Bolton Road, boarding the steamship "Horicon" for an evening excursion on Lake George which will last about three hours and take the party through the Narrows and return. Buffet luncheon and other refreshments will be served on board the boat; music will be furnished by the band of the Union Bag and Paper Corporation. The entire entertainment will be complimentary to the members and guests T. A. P. P. I., the party being the guests of the local paper manufacturers.

Special Arrangements for Ladies of the Party

Special arrangements have been made for the transportation of the wives and daughters of members who are debarred from visiting mills and factories. The ladies of the party will be taken to the boat landing in chartered cars, leaving Saratoga at 5 o'clock P. M. Special cars will be available for the

HAMMERMILL BOND

HAMMERMILL SAFETY

HAMMERMILL LEDGER

HAMMERMILL COVER

The Standard Utility Business Papers and the Most Widely Used Papers in the World

MADE BY
HAMMERMILL PAPER CO., Erie, Pa.
NEW YORK OFFICE: 291 BROADWAY

Bonds—Ledgers Writings

A Grade for Every Requirement

All of the same high standard of value as

SYSTEMS BOND

"The Rag-content Left-dried Paper at the Reasonable Price"

Eastern Manufacturing Company
GENERAL SALES OFFICES
501 Fifth Avenue NEW YORK
Mills at Bangor and Lincoln, Maine

Lincoln Paper Mills
ELKHART, IND.

Manufacturers of

Machine Finish Writings

Machine Finish and Super Calender White and Colored Book

Extra Machine Finish and Super Calender Litho

Mimeograph and Specialties

K.V.P

EYE'LL SAY SO!

¶ When the eye approves, the battle is half won. If a food product *looks* appetizing and wholesome, the consumer really hopes it will *taste* good.

¶ An attractive KVP Waxed Paper Wrapper or Sealer makes the food product more appealing and protects its good quality.

¶ Eye'll say that KVP Waxed Paper makes sales and profit.

Kalamazoo Vegetable Parchment Company
Kalamazoo, Michigan

"World's Model Paper Mill"—Makers of Waxed and Vegetable Parchment Paper

WAUSAU SULPHATE FIBRE CO.
MOSINEE, WISCONSIN
TRADE MARK
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Cut down *excessive* wrapping paper investment. Why carry two wrapping paper lines for one wrapping paper *purpose?*

MOSINEE

presents a perfect wrapping paper, weight and strength for each wrapping purpose. Made in all weights from 15 pounds to 100 pounds basis. The one complete, standardized and economical line of wrapping paper sold.

Mosinee Kraft

"The Wrapper that Delivers the Goods"

return trip to Saratoga for those not provided with automobiles.

Luncheon at General Electric Company's works.

Friday, September 3, 1920

9:00 A. M.—Leave hotel headquarters by chartered cars for a visit to the Schenectady plant of the General Electric Company. Various trips through this interesting plant will be mapped out for the choice of members. Ladies will not participate in the visit to the General Electric plant. A complimentary luncheon will be served to the visitors in the dining hall of the works at 1:15 P. M.

A Visit to Paper Machine Felt Mills

After luncheon chartered cars and autos will take the party to the Plaza in Albany, where the members will be assembled for a visit to the Huyck felt mills, or Albany Felt Company plant, at their option. After visiting these plants, members will again board the special chartered cars for the return trip to Saratoga.

It is of the utmost importance that the Chairman of the Local Committee of Arrangements, Mr. Charles F. Rhodes, International Paper Company, Glens Falls, N. Y., be notified, by means of the reply postal cards sent previously, of members' intention to attend the Fall meeting, it being necessary to arrange in advance for transportation for mill visitations, as well as luncheons, dinners, etc.

Members are again reminded of the necessity of making individual requests for room accommodations at hotel headquarters, Grand Union Hotel, Saratoga Springs, N. Y.

Titrating Bleach

(*Continued from page 715*)

Like yourself, I am very much interested in the exchange of ideas with other workers in the chemical engineering branch of the paper industry.

"After several years of close observation both at this plant and elsewhere, I have come to the conclusion that for daily routine tests, in a comparatively large, well organized, and well manned laboratory, the thiosulphate method of titrating bleach is superior to the arsenite method in regard to both accuracy and ease of manipulation. However, the main objection to the former method in the smaller laboratory is the fact that the thiosulphate solution is rather unstable and has to be standardized every week or so. As you know, the standardizing of thiosulphate solution is too difficult a proposition to be tackled by anyone other than a comparatively skilled chemist. The arsenite method, on the other hand, does not possess these disadvantages. The required chemicals can be obtained sufficiently pure from most reliable dealers and the standard solution made up directly. When once made, it can be kept for several months and no standardizing is necessary. This, obviously is a decided advantage in a small laboratory where bleach tests can be run only weekly or semi-weekly. In fact,

The LINDSAY Wire Weaving Co.

Manufacturers of

DEPENDABLE FOURDRINIER WIRES

Cylinder Covers and Other Paper Machine Wire Cloth

All Well Made at

Collinwood Station CLEVELAND OHIO

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for SAVEALLS
GROUND WOOD WET MACHINES
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Tyler Corduroy Cloth, for use in the paper making industry, has four distinct advantages over other types of screen, namely:

1—It eliminates the necessity of using backing wires.
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Tyler Corduroy Cloth is made from phosphor bronze, monel, or nickel wire, and is carried in stock in all widths up to and including 150 inches.

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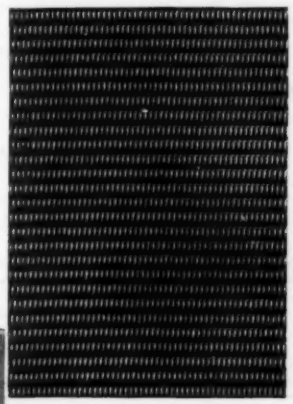
Also Manufacture Fourdrinier Wires, Cylinder Faces, Washer Wires, Backing Wires



The "Tyler" Corduroy Cloth

THE W. S. TYLER COMPANY

CLEVELAND, OHIO

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Paper Mill Architect and Engineer
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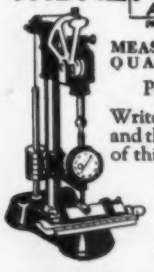
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Paper, Felt, Rubber, Etc.
Write for our booklet—just out—and the story of the development of this universal testing device.
WIDNEY
TEST LABORATORIES
Physical Tests and Research
352 S. Jefferson St. Chicago

it was this very advantage which led me, in preparing my article for 'The Paper Industry,' to describe the arsenite method as the best all-around method for testing bleach IN THE AVERAGE MILL. In addition to this, I felt that the describing of the thiosulphate method would serve no useful purpose, but would most certainly tend to complicate matters in the mind of the average practical paper-maker, who represents the average reader of 'The Paper Industry.'"

"E. G. M."

Testing Tearing Strength

"I HAVE read with considerable interest the article "Testing Tearing Strength of Paper," by Armen Elmendorf, which appeared in your last issue, and it is very interesting.

"However, I want to call attention to several statements in same that are erroneous, and take issue with him in reference to the tests he makes with his instrument.

"I contend that it is not a satisfactory test, inasmuch as the fundamental of his method is wrong, in that it does not give the edge of the paper a chance to function the way it does under normal conditions; that is to say, the property of elasticity is a big factor in the tearing strength of any paper. Further, everyone is interested in the tearing strength of a piece of paper from its natural edge, and not after the tear has started, for once the tear has started, the damage is done, and no one is particularly interested in how much resistance the paper has to a continuation of the tear.

"While I am not familiar in detail with the mode of test as reported in this article, if I understand it correctly, these tests are based on the number of folds, back and forth, that a paper will stand before its fibers become severed or separated. As you can quickly conceive, in envelopes, booklets and books, very rarely are they folded a sufficient number of times to destroy them. In most instances, it is a question of one or two folds, and what is desired is to know just how much the paper has been depreciated in its natural tensile strength."

"S. W."

"I note that S. W. is of the opinion that a tearing test ought to be made from the edge, and that this is best accomplished by bringing the pressure to bear down on horizontal strip gripped at the ends.

"In the tearing test developed by the writer, the endeavor is made to simulate the action obtained by expert paper purchasers who tear a small piece of the paper with their fingers, thereby sensing the average tearing force. The instrument determines the amount of work required to make a tear, and through this gives the operator an average tearing force from the relation, that force times tearing distance equals work.

"It is not the purpose of the instrument to deter-

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Surplus stock taken over from the Du Pont Chemical Co. and other plants.

PRACTICALLY NEW

Used Six Months to Three Years
Offered Subject to Any Inspection

No.	Size, Hp.	Make	Pressure, Lb.
9	600	Edge Moor (Ohio Standard)	200
13	600	Edge Moor	200
20	600	Edge Moor	160
1	813	Edge Moor (A. S. M. E.)	200
Above located in du Pont Chemical Company's Plant at Hopewell, Virginia			
2	295	B. & W. (Stirling) located Carney's Point, N. J.	200
5	253	Stirling Class E No. 22	160
2	264	B. & W.	160
10	512	Stirling Class S No. 26	160
2	512	Stirling Class S No. 26	160
1	823	Stirling M-30 (A. S. M. E.)	200
2	550	Edge Moor	150
2	238	Edge Moor	150
1	231	Edge Moor (Ohio Standard)	150
1	199	Edge Moor	150
1	100	Smith HRT	100
1	50	Ames Locomotive	100
Above boilers located at du Pont Chemical Company's Plant, Carney's Point, N. J.			

MISCELLANEOUS

No.	Size, Hp.	Make	Pressure, Lb.
1	400	Stirling	150
2	400	Wickes	150
2	250	Wickes	165
2	250	Wickes	150
1	300	Wickes	150
1	225	Geary	150
1	250	B. & W.	125
2	210	B. & W.	125
1	125	Scotch Marine	125
1	78 x 20	H.R.T.	135
8	72 x 18	H R.T.	125
2	84 x 18	H.R.T.	100
2	66 x 16	H.R.T.	125
2	66 x 16	H.R.T.	80
1	500	B. & W. Steel header	180

STEEL STACKS

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JORDAN ENGINE FILLINGS,

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Intensive specialists in the manufacture
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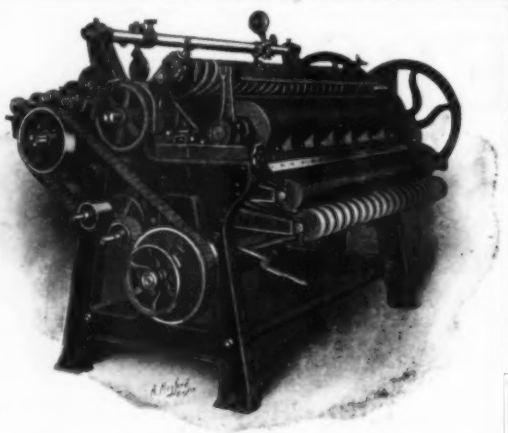
for the pulp, paper and board industry



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Single, Duplex, and Diagonal

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PATENT TOP SLITTERS

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mine the tensile or the folding strength of paper, nor its elasticity, for there are thoroughly reliable instruments in use in all well equipped paper laboratories at the present time to determine each of those properties. The sole function of the instrument is to measure the tearing strength, which is the most important property of paper intended for many uses, as for wrapping and for bags and sacks.

"The instrument developed by the writer not only measures the average tearing force over two tears made in a single sample, but it is usually used to test several samples simultaneously, taken from various places in a sheet. These samples may all be taken across or parallel to the machine direction, or half may be in one direction and half in another direction, thereby giving a still more reliable measure of the quality of the paper. It is well known that the tearing strength may not be the same at all places in a sheet, so that it is very desirable to know the average strength for the entire sheet.

"It will be found upon examination that very few edges of paper that has been handled are entirely free from bruises received in handling, and that a tear will naturally start at such weakened spots. In the case of wrapping paper where a sheet is roughly handled, a projecting corner of an article wrapped may puncture the sheet, and it is important, that after such a rupture has been made, that the tear does not spread. Sacks and bags are similarly punctured by the objects carried, or when in transport they may be ruptured by striking an external object. In order to continue to function as a container, such tears must not enlarge. In each case a tear has started, and it is the magnitude of the average tearing strength that determines the subsequent increase in the length of the fracture.

"It must be borne in mind that every action causing a tear is dynamic and that the action continues until it has spent itself, which means until the energy of the moving object causing the tear has all been consumed, or the limit of the possible displacement of this object has been reached. In case the tear is caused by some human agency and is made inadvertently, it continues until the necessary nerve impulses have been transmitted and the action is brought under control. In each case energy is consumed, and the energy consumed is in turn directly proportional to the average tearing force.

"No action whatsoever that may occur in practice, is so human as to stop the instant a fracture has flashed in sight, yet it is upon this assumption that a static or slow strength test is made.

"Paper is a very non-uniform material, as may be seen slowly tearing a piece of it with the fingers. It tears in jerks. It consists of an interlocking mesh of coarse and fine fibers. When the path of the tear crosses a hard spot or one composed of several relatively large fibers, the force to bring the tear across this spot may be several times as great as in a

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Swenson Evaporators are installed in more than 1000 representative industrial plants thruout the United States.

If these installations were all running at full load for 24 hours there would be a total evaporation of 30,000,000 gallons of water.

And this volume is being increased every day by new installations. The photograph above shows several Swensons ready for delivery.

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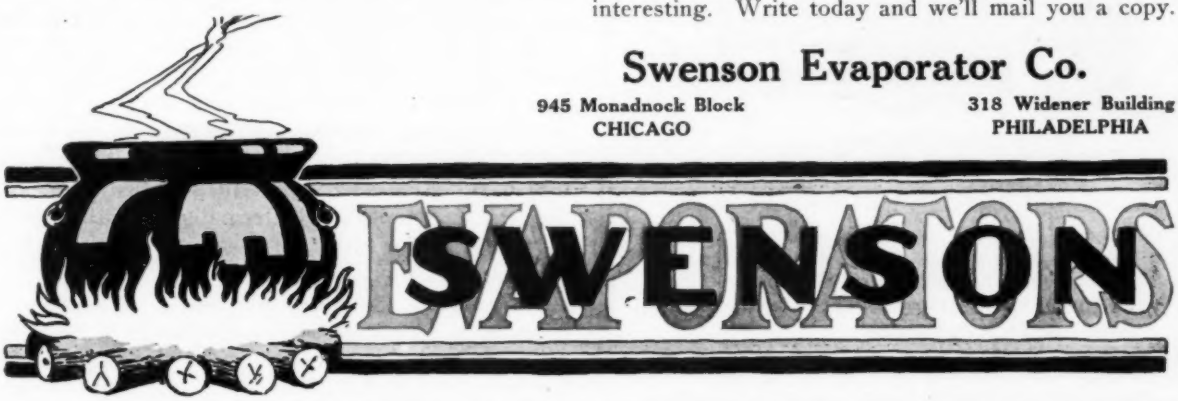

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One hundred per cent pure anhydrous for use **with any control apparatus.**

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Prompt shipments made due to our large capacity.

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Strongest, quickest settling, most stable Bleaching Powder manufactured.

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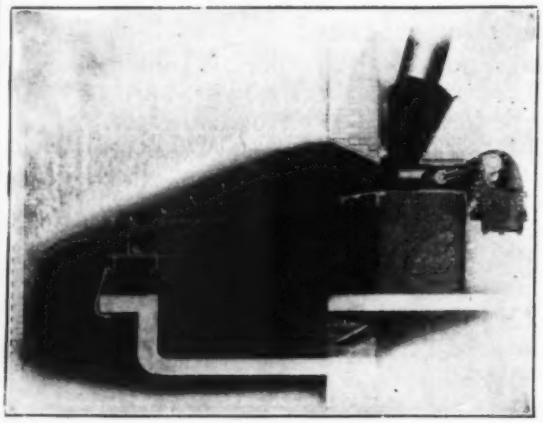
If you have a problem to solve write us, and we will give same the closest and Promptest attention of our Technical Service Staff.

Let Riley Stokers Reduce Your Costs



Cross section through stoker showing automatic operation.

Riley Stokers are always on the job—you can rely on them to be at work every day. They are tireless—working all hours of the day and night—without complaint.

Paper Mills can cut their operating costs to a minimum by using Riley Underfeed Stokers. Consider the following facts:

RILEY UNDERFEED STOKERS

EFFICIENCY—Boiler tests on Riley Stokers have shown over-all efficiencies of 80% and higher.

LABOR-SAVING—One or two men can replace ten or twelve required for hand firing. Continuous, automatic discharge of ashes means elimination of drudgery in fire cleaning. Labor for ash handling in a well laid out plant is negligible.

CAPACITY—Capacities of 200% and more can be obtained over long periods which means fewer boilers with corresponding decrease in investment and maintenance.

COMPLETE COMBUSTION—The underfeed method and moving grates intimately mix the proper amount of air and coal, giving perfect combustion.

Catalog D-8 sent on request.

Sanford Riley Stoker Co.
Worcester, Mass.

weaker place. In a static tear, if correctly made, it is the strength across these hard spots that is being determined, and not the average strength over the entire gap torn.

"Testing the tear strength of paper by transverse loading of a specimen gripped at the ends must further be condemned for the following reasons:

"1. In order for the test to be feasible, the load must be applied in increments by adding weights onto a pan. Unless these weights consist of very small units and are added progressively, the accuracy of testing will not be great. In order to make the results accurate, these units of weight must be so small that the test ceases to be practical.

"2. One can never be certain that the stress distribution across the section is always the same. The one operator may grip his specimen so as to concentrate the stress near the edge, another so that the stress may be more uniformly distributed over a broader section. Even small differences in the manner of gripping will cause differences in the distribution of the stress across the section. It is obvious that if the stresses are concentrated near the edge, the tearing strength value registered by the instrument will be lower than if a slight distribution of stress occurs.

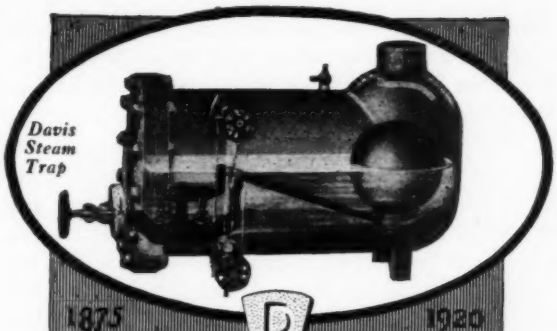
"3. The load bearing down on the center is not a measure of the stress in the paper strip. This stress is entirely dependent upon the deflection of the point of application of the load. For the same center load any stress within limits may exist in the paper, depending upon the angle the strip makes with the direction of application of the force.

"4. The element of time cannot be very readily controlled when tested statically by loading a strip as mentioned. It is a well known fact that the tearing strength or any other strength property of paper will vary with the rate of application of the load. One operator may consume several times as much time in testing as another. Even though they be testing the same paper under the same conditions they will obtain different strength values."

"A. E."

College Course in Paper and Pulp Making

The plans for a college four-year course in paper and pulp making have so far been completed by the New York State College of Forestry that a letter is being sent out to prospective students giving the complete details of the four-year course by semesters and by branches. Prof. C. Earl Libby, in charge of the department, has been amazed by the large number of calls for information on such a course, and anticipates that there will be a large number of freshmen this year who intend entering the paper industry as college trained paper makers. The number is, in fact, so large that the college is accepting for this, as for regular forestry courses, only those who are apparently particularly well fitted for such



1875 D 1920

MAKE MONEY by SAVING IT

In most paper mills manufacturing costs have been cut to the bone. The only remaining factor presenting possibilities for further economy is operating costs. Foremost among operating costs are power costs, and it is in this end of the paper mill that Davis Valve Specialties effect a substantial saving—a saving in steam which means money saved, or to put it another way, money made.

Write for a complete description of Davis Specialties.

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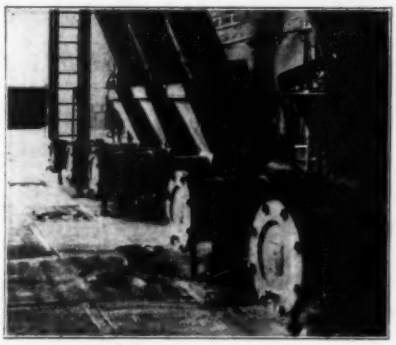
Six Years in Operation—Always Satisfactory



Where the American is satisfactorily operating. Note ash intakes before Jones Stokers

The American Steam Ash Conveyor was installed in the boiler plant of the Mishawaka Woolen Mfg. Company, Mishawaka, Indiana, in 1914. After six years steady operation, the company engineer writes—"Very satisfactory, indeed."

AMERICAN STEAM ASH CONVEYORS

give "less trouble in the Boiler Room than any other conveying equipment we have had any experience with."

Over 60 paper and pulp mills add their endorsement too. Reasons why are found in Catalogue P. Ask for your copy.

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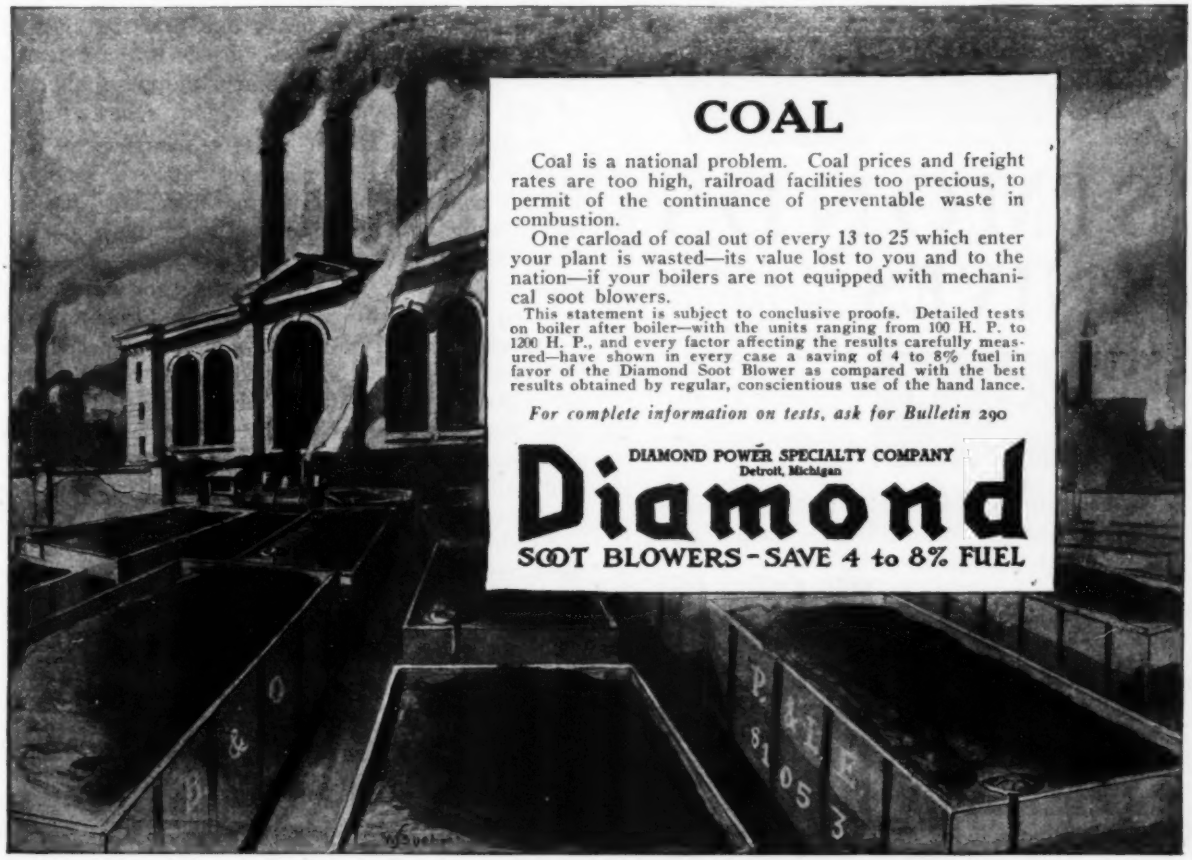

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One carload of coal out of every 13 to 25 which enter your plant is wasted—its value lost to you and to the nation—if your boilers are not equipped with mechanical soot blowers.

This statement is subject to conclusive proofs. Detailed tests on boiler after boiler—with the units ranging from 100 H. P. to 1200 H. P., and every factor affecting the results carefully measured—have shown in every case a saving of 4 to 8% fuel in favor of the Diamond Soot Blower as compared with the best results obtained by regular, conscientious use of the hand lance.

For complete information on tests, ask for Bulletin 290

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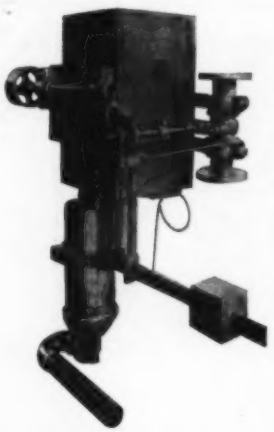
Detroit, Michigan

Diamond
SOOT BLOWERS - SAVE 4 to 8% FUEL



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Trimbey Automatic Consistency Regulator

REGULATORS that REALLY REGULATE. which will cause stock to be delivered to beaters, mixers or paper machines at a uniform consistency. Something long sought in the paper industry.

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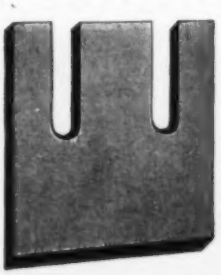
We make all kinds of Machine Knives, including Chipper, Barker, Paper Cutting Knives and CIRCULAR CUTTERS



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"THE SAW MAKERS"
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5 Factories *12 Branches*

a course. By the time the registration period ends, it is probable that the college will be so flooded with applications that it will not have capacity for all who wish to enter.

Of the new course, Professor Libby says: "In comparing the paper and pulp course with that of the General Forestry course, it will be seen that the first year's work in both courses is identically the same. The work of the second year is more specialized, the student continuing his work in chemistry and physics as both these sciences are fundamental to a student who desires to graduate as a pulp and paper engineer. During the third and fourth year the student will take up work directly bearing on the production of pulp and paper, although it should be noted that the course outlined for 1920-21 in the Junior and Senior years differs but slightly from the established Forestry course for the reason that there are at present no students in the College who have had the proper preliminary training to allow them to take up this specialized work.

"Students who register in the pulp and paper department in September, 1920, as Freshmen or Sophomores will be able to graduate as pulp and paper engineers if the plans of the College mature. To enable them to do this, the work of the Junior and Senior years will be devoted almost exclusively to chemistry, mechanical and electrical engineering, and the more technical phases of pulp and paper manufacture, including the theory and practice of pulp manufacture by all processes, the design and operation of paper making machinery, the bleaching and coloring of stock, paper testing, etc.

"Students who are at present members of the Junior and Senior classes at this college or students in other colleges who desire to enter here with advanced standing will be required to complete all fundamental courses of the first two years, especially physics, chemistry, and mathematics, for which they have no credit, before they will be allowed to take the more advanced courses in pulp and paper chemistry and graduate from the college as pulp and paper engineers. At present, a minimum of two years' work would be required of any student whatever his standing, as the organization of the pulp and paper courses is so incomplete that he could not obtain the necessary amount of training in this field until he had completed the additional courses in pulp and paper technology, which will be given during the year 1921-22."

The curriculum, in detail, is as follows:

First Year

Identical with General Forestry Curriculum

General Forestry I	2 hrs.	Forest Zoology	4 hrs.
English I	3 "	English I	3 "
Forest Botany I	4 "	Forest Botany II	4 "
Forest Mathematics I	3 "	Chemistry I	4 "
Modern Language	3 "	Modern Language	3 "
Chemistry I	4 "		
	19 "		18 "

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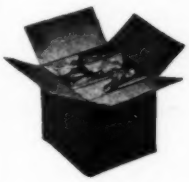
Paper Can Machinery

Complete sets of machinery for making cans such as are used for packing oats, coffee, baking powder, tobacco, snuff and cleansing powder.



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We build all the machinery necessary for the installation of complete plants.

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Machines for cutting and rewinding roll paper. We build all width machines to handle any weight or thickness paper and any size roll.

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The Carthage Chipper
BETTER THAN EVER

The Carthage Improved Chip Crusher
AS GOOD AS THE CHIPPER

The NEW Carthage Pulp Shredder
A REMARKABLE PERFORMER
IT DOES WHAT NO OTHER SHREDDER CAN DO

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KEEPS DIRT OUT OF YOUR SHEET

The Carthage Ball Bearing Straightway Blow Valve
IT IS VERY DURABLE IT IS EASY TO HANDLE

Barkers	Pumps	Wet Machines
Wood Splitters	Chip Screens	Plug Machines
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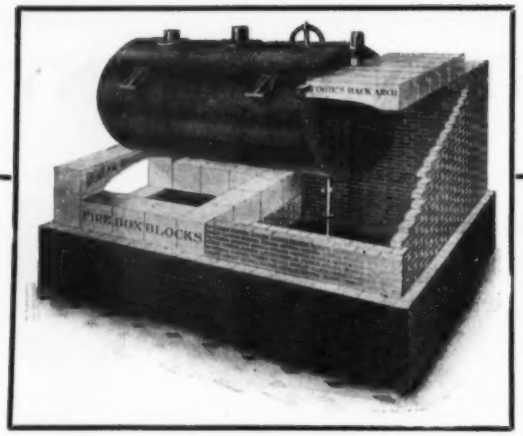
The Carthage Machine Company

Carthage New York



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Gentlemen:

Please send your new catalogue on "Steel Mixture" boiler settings. Also a Book of Measurements.

Name .....

Address .....

Second Year

Silviculture II	3 hrs.	Wood Technology I	3 hrs.
Wood Technology I	3 "	English II	3 "
Physics I (or 23 or 24)	4 "	Physics I (or 23 or 24)	4 "
Chem., Qual. Analysis	3 "	Chem., Qual. Analysis	3 "
Mechanical Drawing	2 "	Mechanical Drawing	2 "
	15 "		15 "

Third Year

Wood Technology III	4 hrs.	Forest Economics I	4 hrs.
Forest Chemistry III	4 "	Forest Utilization II	3 "
English IV	1 "	Forest Chemistry III	4 "
Pulp Manufacture	5 "	Paper Manufacture	5 "
Forest Utilization	4 "	Paper Testing	2 "
	18 "		18 "

Fourth Year

Silviculture V	4 hrs.	Forest Engineering IV	3 hrs.
Forest Engin'r'g VIII	3 "	Silviculture III	3 "
Forest Zoology II	3 "	Silviculture VII	2 "
Forest Economics VI	2 "	Silviculture VIII	3 "
Forest Economics V	3 "	Rhetoric IV	3 "
Elective	4 "	Elective	4 "
	19 "		19 "

It should be noted that this Curriculum is effective for the college year 1920-21 only. Additional courses in Pulp and Paper Manufacture will be offered for the year 1921-22.

Ninth Annual Safety Congress

The best methods of saving fingers, hands, arms, legs, and lives and of conserving labor and increasing production through accident prevention and industrial medicine, will be discussed at the Ninth Annual Safety Congress of the National Safety Council at Milwaukee, September 27 to October 1, the program for which will soon be completed.

During these five days, four thousand men and women—safety engineers, industrial relations managers, municipal traffic officers, educators and plant executives—will gather at the Milwaukee Auditorium to throw into the common pot all the information on accident prevention that has developed during he past year.

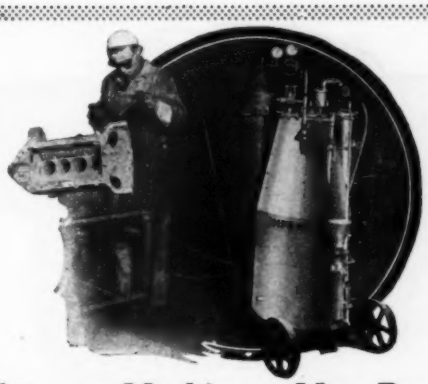
The 1920 Safety Congress will be the most important in the history of the safety movement. One hundred and eighty speakers, each an expert in some particular line of safety work, are on the program. Accident prevention will be discussed not as a humanitarian proposition alone, but with reference to the most important industrial problems of the day—under-production and labor unrest. Safety is no longer a haphazard proposition; it has been developed through the expenditure of millions of dollars by the industries of America and through years of research and experimentation, into a science with fundamentals as definite as those of chemistry, biology or physics.

A special session of the Congress has been arranged where beginners in the field of organized accident prevention will be instructed in these fundamentals. This "A B C" session will be addressed by experts in the organization and operation of industrial safety departments. The Congress program includes a debate on the bonus system in safety

When buying a pump it is well worth your time to make a careful selection and carefully compare the various features to be considered in choosing the proper pump for the service to be performed. We would like to be of assistance in advising the purchaser the vital points which we consider of importance in making a selection and feel our fifty years' practical experience should be of some value.

Send for Catalogue 127

DEAN BROS. STEAM PUMP WORKS. INDIANAPOLIS.



Wherever Machinery May Break a Welding Outfit Is Needed

Welding is no longer considered the special province of the expert. Any sensible man can quickly learn to use an Imperial outfit.

Wherever machinery may break or there's metal to work, a welding outfit is necessary.

Imperial Welding Equipment

MAKES ITS OWN ACETYLENE

Runs at the lowest cost of any outfit on the market. The Imperial Generator, secured by special safety devices, makes acetylene 2 to 5 cents cheaper per cubic foot than you can buy it.

There's a size designed for paper mill use. Write for free catalog, and let us tell you about it.

THE IMPERIAL BRASS MFG. COMPANY
516 S. Racine Ave. CHICAGO, ILL.

Makers of Welding, Cutting, Carbon and Lead Burning Equipment and Supplies.

Let *Bayley* Engineers Furnish Plans

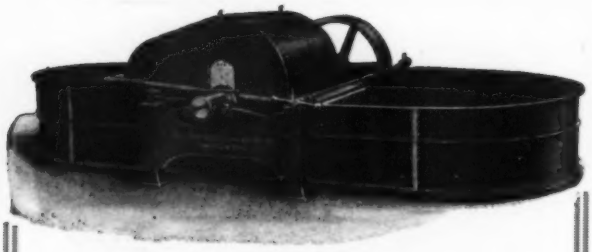
For your heating, ventilating and drying systems. Years of practical experience on actual paper mill work have given them an insight into the requirements of the paper industry which enables them to handle your problem intelligently. Their services are yours for the asking.

Bayley Chinook Heaters and Plexiform Fans

are the result of their ingenuity and practical knowledge of heating and ventilating requirements. The Chinook is the only heater that can be shipped K.D., and repaired without taking down the entire section. Plexiform fans are built for durability, efficiency and ease of operation and are accurately balanced.

Full information on these and other Bayley heating specialties free on request

Bayley Manufacturing Co.
Milwaukee, Wisconsin



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Beating Engines
are Built
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Heavy Duty

Dayton Beater and Hoist Co.
DAYTON, OHIO

Appleton

Felts and Jackets
Manufactured By
APPLETON WOOLEN MILLS
APPLETON, WIS.

work between J. Claude Smith, Safety Director of the Inland Steel Company, and Philip Stremmel, Superintendent of the Hot Mills, National Enameling and Stamping Company.

Following is the program for the Paper and Pulp Section:

WEDNESDAY MORNING,
September 29, 9:30 O'Clock.

1. The Safety Game As It Is Played in One Plant.
   a. The Man on the Job.
      Mike Corcoran, Kimberly-Clark Co.
   b. The Foreman.
      Henry Bongers, Kimberly-Clark Co.
   c. The General Superintendent.
      Ernst Mahler, Kimberly-Clark Co.
   d. The Employment Secretary.
      Miss Mary Baker, Kimberly-Clark Co.
      M. G. Hoyman, Kimberly-Clark Co.
   e. The Safety Director.

THURSDAY MORNING,
September 30, 9:30 O'Clock.

1. Paper Mill Accident Records.
   R. H. Guerrant, Safety Engineer, National Safety Council.
2. What Is Being Done in the Pulp and Paper Industry to Bring Education Within the Reach of Every Employe.
   J. R. Stephenson, Editor, Canadian Pulp & Paper Magazine, Quebec, Canada.
3. The Economic Aspects of Safety Work and Kindred Efforts.
   H. T. Carruth, General Manager, Mead Paper & Pulp Co., Chillicothe, Ohio.

More About the "Niagara"

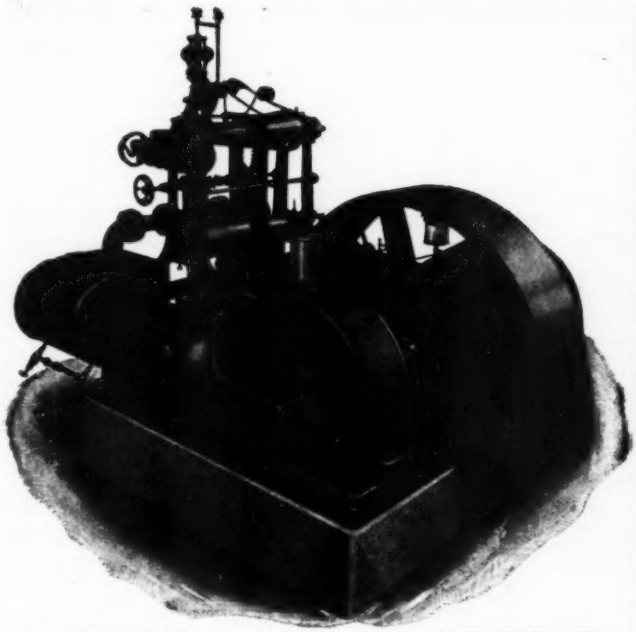
SUPPLEMENTING the technical article regarding the "Niagara" beater which appeared in the June issue of "The Paper Industry," the following general information, we believe, will be of interest:

It is a conceded fact that within the last thirty or forty years few steps forward in raising the efficiency of beaters have been made. The flat Holland type engine of today is but little different than the one of fifty years ago. The general design is the same and the stock circulates in the same slow manner.

The "Niagara," however, as regards both these points, embodies almost a revolutionary change and is a real step up the ladder of development.

Not only is it equipped with the latest type of bandless roll, but it differs in design from the lengthy, broad, shallow, flat type of beater, in that it is very compact and deep. It is 4½ ft. high at the charging end and 7 ft. high at the back.

Although occupying the floor space of 20 ft. in length by 14½ ft. in width, or the space of an ordinary one thousand pound beater, it is capable of taking in over two thousand pounds of dry stock and



Variable Speed Engine

The engine illustrated above is especially designed to drive paper machines, giving continuous and reliable service. A patented safety device protects your employees and plant.

THE BROWNELL CO., Dayton, Ohio

SEND FOR BULLETIN E-4

We Specialize Repairing

An Old Gauge Made New

SEND US YOUR OLD GAUGES

We can make them better than new—prompt delivery guaranteed — uniform quality at a satisfactory cost

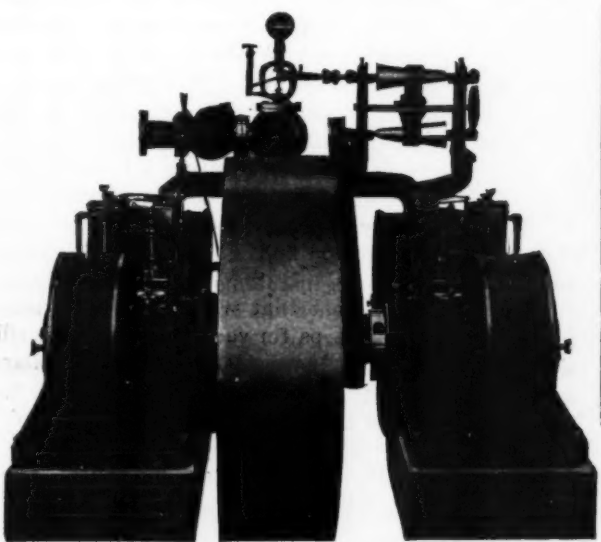
We Pay Express Charges Both Ways

The men employed by us are experts in this line. We have the capacity and equipment to handle a large amount of this work. Give us a trial.

Write for particulars of Our New Hydraulic Gauge. Eliminates spring troubles and stops Vibration.

THE MANNING GAUGE CO., Inc.
77 Traverse Street Boston, Mass.

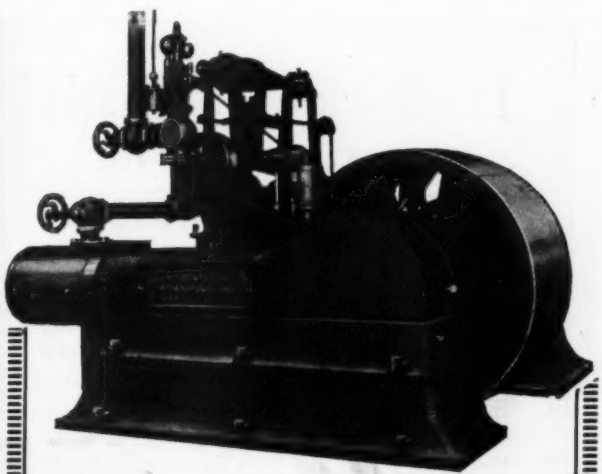
Inquirers Please Mention THE PAPER INDUSTRY



THE BALL VARIABLE SPEED ENGINE

solves the problem of your variable speed drive. Its reliability results in maximum production. That's why *one in every three of these engines is a repeat order.*

Ball Engine Co., Erie, Pa.



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Paper Mill Economy is assisted very materially by the installation of High Grade Variable Speed and Constant Speed Engines.

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FOR SALE

50 Ton Board Mill in Excellent Location

2—5 cylinder Paper Machines 55 dryers each—62″ trim.

5 Beaters and 4 Jordans.

3 Private Railroad Sidings.

Coal mine goes with the property.

Entire mill buildings, machinery, dwellings, et al. in fine condition.

The price is right and the mill is a big money-maker.

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Paper and Pulp Mill Brokers

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OUR MOTTO: "Service First"

The Stickle Automatic Steam Control for Paper Machines

WE wish to emphasize the word "automatic." This with us means that the steam follows changes that come to the sheet from free to hard drying stock or any ordinary changes in weights. A control that does not do this in itself is not automatic. This makes a better sheet of paper. We guarantee to hold the moisture at any point you wish with ½ of 1% change. Furnished on 60 days' approval.

OPEN COIL HEATER & PURIFIER CO.

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BOSTON **PHILADELPHIA**

circulating it when at a consistency of 7 per cent to 8½ per cent, at the rate of 95 ft. per minute. This is six times as fast as the ordinary beater, and means therefore that one "Niagara" is capable of doing the work of three Holland type engines, thereby effecting a great saving in beating time, floor space, installation cost, motors, power, belting and labor.

The first Niagara was put in operation at the Kimberly mill of the Kimberly-Clark Company after thorough tests were made on different grades of stock. It was found that the "Niagara" had the following capacities per day:

	Tons	H. P.
Book stock	60	85
Old paper stock	40	85
Kraft stock	12	125
Rags	10	150

The Kimberly-Clark Company were so pleased with the results of the tests, that they immediately ordered five "Niagaras" for their Niagara Falls mill.

The Gilbert Paper Company, of Menasha, Wis., whose stock consists mostly of No. 1 overall cuttings, the most difficult kind of stock to beat, after thoroughly testing the Niagara ordered five. They are replacing sixteen of their Holland type engines with them, and find that by so doing will save themselves over six hundred horse power yearly. With power selling at the rate of eighty dollars per horse power, this means a saving of forty-eight thousand dollars per year. Incidentally, they also saved themselves seventy-five thousand dollars which they had planned to spend in connection with the erection of a new building for additional beaters. This saving was primarily due to the small floor space required by the "Niagaras." Besides these firms the Marathon Paper Mills Company, Menasha Printing & Carton Company, Thilmany Pulp & Paper Company, Pride Pulp & Paper Company, Neenah Paper Company, E-Z Opener Bag Company, and a long line of others equally prominent are installing this type of beater.

Although the "Niagara" has only been on the market since the latter part of June, it has attracted the widest interest through the United States, Canada and England.

A. P. P. A. Fall Conference

The decision to hold a Fall Business Conference of the American Paper and Pulp Association on November 11, at the Congress Hotel, Chicago, makes this the first time that the association has ever held a meeting in the Middle West, and on its result will depend whether or not the association should come West with its meetings from time to time.

The selection of Mr. Arthur H. Nevius, of the Miami Paper Company, West Carrollton, Ohio, as Chairman of a Western Committee on Arrangements assures the association that with such a committee as he will develop there will be a fine representation

Paper Mill Lubrication Raised to the Highest Degree of Efficiency

In order to "make good" day after day in paper manufacturing a lubricant must be able to "stand up" under excessive bearing pressure and resist the heat transmitted by steam as well.

Extensive use of Keystone Grease in large paper mills throughout the country conclusively proves it to be unparalleled for the lubrication of both calender and finishing rolls of any character, particularly where unusual heat conditions exist.

KEYSTONE TRADE MARK REG. U.S. PAT. OFF. GREASE

Write today for our free Bulletin Number 23.

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Executive Office and Works:
Philadelphia, Pa.
Established 1834

New York, Boston, Pittsburgh, Chicago, St. Louis, Denver, San Francisco, Minneapolis, Houston

The CHICAGO Approved Portable WATCHMAN'S CLOCK

with its special Waltham movement, its lock stations and its superior quality throughout, is especially desirable for mills and factories and for either in-door or out-door patrol.

Write for booklet.

CHICAGO WATCHMAN'S CLOCK WORKS
9 Church Street, NEW YORK
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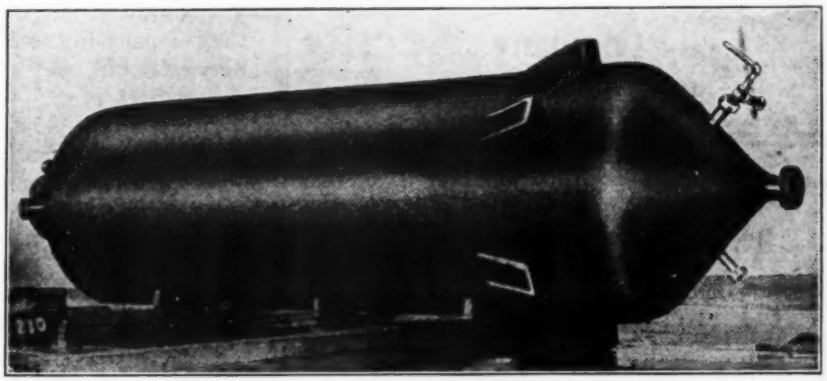
Kellogg

Seamless Welded DIGESTERS *and* TANKS

FOR PAPER AND PULP MILLS

We make them of any thickness, diameter or length for paper and pulp mill uses.

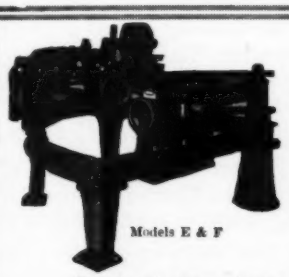
WITH your mill running 24 hours per day and still unable to meet all the demands of your customers, a leak in your digesters or tanks means a big loss to you. You will avoid all this trouble if you install Kellogg's Seamless Digesters and Tanks, welded by the Forge and Hammer Process, the strongest weld of any process in existence.



Testing Seamless Hammer Forged Welded Sulphate Digester for Brown Corporation, La Tuque Mill, Quebec.

To the man that is willing to be **"shown,"** just ask us to **prove** their economy and efficiency. A letter will start the ball-a-rolling.

THE M. W. KELLOGG CO. **140 Cedar Street, New York**



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Cold Pipe Bending Machines

Standard of the world.

Bends all sizes of pipe from ⅛ in. to 8 in.
Hand or motor operated.

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Large Arch and Square Blocks a Specialty
All Shapes and Sizes

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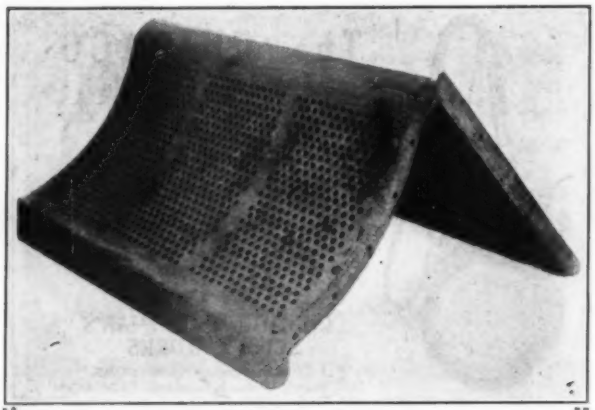


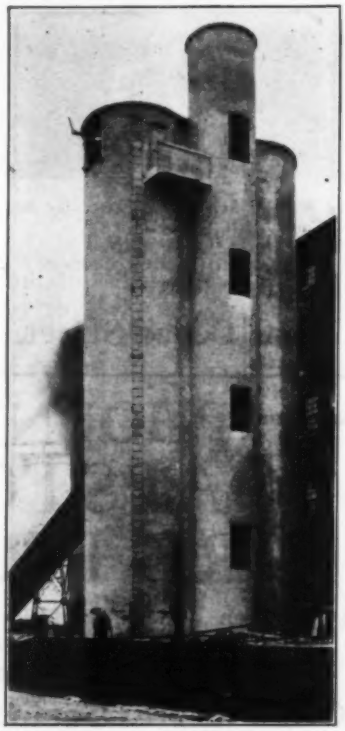
Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

The Shartle Continuous Beater Company
MIDDLETOWN, OHIO

Jenssen Two-Tower Acid System

56 Installations in operation or under construction on this Continent or Abroad

G. D. Jenssen Company
200 Fifth Avenue
New York



Jenssen Acid Towers at Great Northern Paper Co. Mill at Millinocket, Maine

at the conference from the different paper manufacturing districts of the Middle West.

Affiliated organizations will hold meetings at the Congress Hotel and possibly elsewhere in Chicago, November 10 and 12. These associations are being asked that, in so far as possible, the date of November 11 be left open for the conference of the parent association. The morning meeting will be held in the Elizabethan Room and the luncheon and afternoon meeting in the Gold Room of the Congress Hotel.

Northeastern Division, A. P. P. M. S. A. Meeting

Announcement has been made by H. H. Hackett, chairman of the Northeastern Division of the American Pulp & Paper Mill Superintendents' Association, that the next meeting will be held at the plant of the Eastern Manufacturing Company, South Brewer, Maine, on Wednesday, September 8th.

The program for the meeting will be as follows:

1:30-3:00 p. m. Business meeting.

3:00-5:00 p. m. Tour of inspection through the mills of the Eastern Mfg. Co.

5:00-6:30 p. m. Complementary dinner served by the company in the dining room connected with the Service Dept.

6:30-8:15 p. m. Will be devoted to reading and discussion of papers by members of the association, and matters relative to pulp and paper industry.

Members wishing to take the western train will have ample time to make connections in Bangor as the train does not leave until 9:00 p. m. local time.

Decennial Celebration at Forest Products Laboratory

Extensive conservation of our national wealth of wood through more efficient utilization was the keynote sounded throughout the Decennial Celebration at the Forest Products Laboratory at Madison, Wisconsin, July 22-23. Over 200 visitors from all parts of the country were present, representing every line of wood-using industry, including 59 wood-using associations and companies, 18 lumber manufacturing associations and companies, the Deans of 12 Forestry schools, the United States Forest Service, and other visitors and friends. They came to pay tribute to the laboratory's ten-year record of service to American industry.

The Forest Products Laboratory is a Government institution of industrial research in wood and all wood products maintained by the United States Forest Service in coöperation with the University of Wisconsin. In this work 220 engineers, wood technologists, manufacturing specialists and assistants are employed in developing new uses for wood and improving present manufacturing methods. Investigations and experiments are undertaken both independently and for individuals and companies on a

coöperative basis. Results obtained are disseminated through coöperative reports, commercial demonstration, correspondence, Government bulletins, mimeographed circulars, articles in the trade press, and practical instruction courses given at the laboratory.

The committee in charge of the celebration was as follows: Governor E. L. Philipp of Wisconsin, Honorary Chairman; H. F. Weiss, Burgess Laboratories, Madison, and former director of the laboratory, Chairman; C. P. Winslow, Director, Forest Products Laboratory, First Vice-Chairman; H. J. Thorkelson, Business Manager, University of Wisconsin, Second Vice-Chairman; and Don E. Mowry, General Secretary, Madison Association of Commerce, Executive Secretary.

The opening session of all the gathering convened in Agricultural Hall at 10 o'clock on the morning of July 22. Mr. H. F. Weiss was chairman. The program of addresses included Mr. Weiss' introductory remarks; "Legislative Measures for Forest Conservation," by Governor Philipp; "Translating Knowledge Into Power," by President Birge of the University of Wisconsin; and "The Forest Products Laboratory," by C. P. Winslow, present director of that institution.

After luncheon the program continued with the inspection of the work and exhibits of the laboratory. Guides in charge of small parties showed the visitors the various lines of endeavor in which the laboratory is saving millions of dollars a year to the people of the country. Following the inspection trip was a period for recreation consisting of automobile tours around the city, boat rides, and swimming.

Nearly 500 prominent lumbermen, manufacturers and users of forest products, and members of the Forest Products Laboratory attended the banquet in the evening. Mr. Burr W. Jones presided as toastmaster. Lieutenant Colonel W. B. Greeley, Chief Forester of the United States, spoke on "Forests and National Prosperity." Following the address of Colonel Greeley Mr. Max Mason, Research Specialist of the National Council of Defense, gave an illustrated talk explaining in detail the submarine detector which he perfected during the war and which was successfully used in European waters.

At the Friday evening session Mr. John Foley, Forester for the Pennsylvania Railroad, was chairman, introducing the speakers as follows: D. C. Everest, Secretary and General Manager, Marathon Paper Mills Company, "Some Problems of the Pulp and Paper Industry"; H. E. Howe, Chairman, Research Extension Division, National Research Council, "America's Place in Industrial Research"; and W. A. Gilchrist, representing the National Lumber Manufacturers' Association, on "Some Problems of the Lumber Industry."

The formal program of the Decennial ended with a luncheon.

Lockport Felt Company
NEWFANE, NEW YORK
MAKERS OF
Fine Felts for Fine Papers
ALSO MAKERS OF
Best Felts for *all* Papers
SATISFACTION GUARANTEED

The Cost of a Paper Machine Wire Can Be Figured Only on the Basis of Service Rendered

1—Rapid strides are being made today in combining materials to produce a result which will give greater service.

2—A metal has been perfected for the manufacture of wires, other than fourdriniers for paper and pulp mills called NICKEL ALLOY.

3—**O'NEILL NICKEL ALLOY** wires have demonstrated by their performance in some of the largest mills of this country, that their life and service show approximately 400% better investment for the pulp and paper manufacturers. Upon request testimonials will be gladly submitted.

4—We recommend that you try the **O'NEILL NICKEL ALLOY WIRES.** They cost more but they are worth it.

5—We also manufacture very durable paper machine wires of brass and bronze in plain, double warp, triple chain, and twisted weaves.

Joseph O'Neill Wire Works
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NORTHERN ENGINEERING WORKS. DETROIT, MICH.

MAKE THE HANDLING OF

Parchment

Profitable to You

¶We have prepared Samples, put up in neat cartons, for the Jobbing Trade.

¶If you have not received a set we will gladly send one.

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Best Quality

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Printing Papers of Merit

For **LETTERPRESS, OFFSET** *and* **LITHOGRAPHIC PRINTING**

Offset Blanks Offset Bristols

Porcelain, Peninsular and Purity Enamel Book

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Kalamazoo, Michigan

PAPER

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Let us submit an estimate on your next

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or Magazine

It has not been surprising to most factors in the paper industry that demand for paper has quieted in some degree. Paper consumers, along with those of various other commodities, invariably let up in their buying operations during the mid-summer, and the recession in demand for paper in recent weeks is but a natural condition and one that had been generally anticipated. As a matter of fact, the narrower demand has had no perceptible influence on prices, nor does it seem likely to during the remainder of the summer. The decrease in buying has not been sufficient to affect values, and on this score it can be stated that the paper industry is in a healthier and more favorable position today than probably any other manufactured commodity market. When one stops to consider the position of paper mills, it can be readily understood why prices rule so firm in the face of a quieter call for their product. The average paper manufacturer in the United States; in fact, it can almost be said every paper making concern in the country, is sold ahead anywheres from a month to six months, and has little or no paper to offer for spot delivery. Moreover, producers of paper are mostly refusing to accept orders for future shipments excepting from regular customers and even then only when no definite time is specified for delivery, being contracted so far ahead that they do not feel justified in entering into additional commitments.

An easing off of demand from transient buyers therefore is more or less of a negligible factor, and prices on all kinds of paper display a distinctly strong undertone. Throughout the trade there is a well defined belief that the fall will witness a situation as regards tightness of supplies unequalled at any time during the remarkable past six months. Mills and jobbers fortunate enough to have small surplus stocks of paper are not endeavoring to market these holdings at present. Nearly everyone is of the opinion that higher prices will be reached within the course of a few weeks, and sellers of paper are permitting buyers to pursue their own chosen policy at the moment and are not pressing them to absorb the limited supplies available in the market.

Of all grades of paper, book papers seem to be in the strongest market position. Publishers of magazines and of various kinds of books are looking about trying to locate spot and forward supplies of paper and show conclusively by their actions that they are short of required amounts for the rest of the year. Mills are almost entirely outsold, many refusing to make any offerings whatsoever, and the slight tonnages to be had for prompt or future delivery are bringing very high prices. Machine finished book papers are selling at 17 cents and more a pound, supercalendered book at 19 to 20 cents and coated book paper at 21 cents upward. In some instances where spot lots have been involved prices even in excess of these have been realized. There are numerous indications that prices on book papers have yet to touch top levels; many members of the trade freely predicting further advancement in the autumn.

News print is moving in consistent fashion into consumng channels on contract and against open market orders. Demand for spot lots is seasonably quiet but prices are maintained at around 12 cents per pound, and offerings do not remain long unabsorbed in the market. Fine papers are quotably strong and are in good demand. About the cheapest grade of writing paper obtainable today costs 18 cents a pound and the quality of this paper is such that few consumers will use it, nor is there much supply available. Wrapping papers are in steady movement and mills are making few new commitments, having sparse amounts of their products to sell. Tissues are quotably firm. Boards of all kinds are sought by buyers in comparatively large quantities and quotations are maintained with the tendency toward higher levels.

How Paper Stock House Met Car Shortage

In these days of car shortage and railway difficulties it is interesting to note how the Mendelson Bros. Paper Stock Co. of Chicago used every resource in its power to keep up its shipments of paper stock to the mills. Not a car showed up on their private tracks, and appeals to the railway officials were fruitless. So they went at it on their own hook, since the railroads could make no definite promises. Mr. Mendelson and his staff scoured the city of Chicago looking for empty cars on sidetracks or anywhere in fact, and when they found one, they stood guard over it until it was filled with paper stock, ready to go to the mills.

By means of its fleet of motor trucks, owned and operated by the concern, this problem was solved. One of these huge motor trucks with a trailer made up a carload, and it was a simple matter, after they were once started on the right track, to clear their warehouse of stock. Carload after carload went to the mills in this fashion. The mills are still wondering how Mendelson accomplished the impossible.

Does a man feel girlish when he makes his maiden speech?

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Bleached and Unbleached
Foreign and Domestic

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Made by Port Huron Sulphite & Paper Co., Port Huron, Mich.

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Bleached Easy Bleaching

Unbleached Sulphites

Spruce and Poplar Ground Wood Pulp

Domestic *Export*

BATHURST LUMBER COMPANY, LIMITED

PRICE & PIERCE, LTD.

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SOLE SELLING AGENTS
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Unbleached Sulphite 50 tons daily
Kraft Pulp 50 tons daily

Our pulp is made from Canadian Spruce
We ship in sheets, baled

BATHURST, NEW BRUNSWICK, CANADA

Papermaking Rags

The papermaking rag market presents a divided condition of affairs. There is a fairly good demand from mills for new cuttings of most kinds and this class of rags is firm in price, whereas old stock is largely neglected by buyers and is steadily declining in price. The reason for this situation chiefly is that there is a scarcity of new rags, owing to the slow operations of clothing manufacturers and a resultant lack of production of cotton clippings, and a surplus supply of old rags. Large quantities of foreign rags, mainly of roofing quality, have come into the country in recent weeks and deliveries of these supplies, together with domestic material, has put paper mills in a position where they have ample stocks of old rags for a tile. Current buying consequently is limited and those buyers in the market are securing supplies at very nearly their own prices.

Despite the present condition of the market, everything would seem to point to a strong situation and high prices in the fall. European rag merchants are authoritatively said to be refusing to enter into commitments at prices which importers can afford to pay against present domestic market values here, which would appear to indicate that if further supplies are to be obtained abroad higher prices must be granted. Domestic stocks are not heavy although there is a plentiful supply at the moment. Packers and dealers generally are bullishly inclined regarding the future and are predicting big things for the market during the next several months.

Sales of domestic roofing rags have been recorded in the East at as low as 2.25 cents a pound for No. 1 packing. In some instances, mills have bought odd carloads at even under this figure, representing a drop in prices since the market reached its peak a few weeks ago of almost 50 per cent. Old whites are slightly lower at a basis of about 14 cents per pound for No. 1 repacked, while thirds and blues are quotably easier at between 4.25 and 4.50 cents for repacked thirds. New white shirt cuttings are firmly held at 21.50 to 22 cents per pound, fancy shirt cuttings at 13.50 to 14 cents, unbleached muslins at 17.50 to 18 cents and No. 1 washables at 10.50 to 11 cents. Quotations f.o.b. shipping points follow:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	21.50-22.00
White shirt cuttings, No. 2	14.00-15.00
Fancy shirt cuttings	13.50-14.00
Washables, No. 1	10.50-11.00
Unbleached muslins	17.00-17.50
White lawns	19.00-19.50
Overall cuttings, blue	13.00-13.50
Black silesias	7.50- 8.00
Old Stock—	
Whites, No. 1 repacked	14.00-15.00
Whites, No. 2 repacked	7.00- 7.50
Whites, house soiled	4.00- 4.25
Whites, street soiled	3.75- 4.00
Thirds and blues, repacked	4.25- 4.50
Thirds and blues, rough	3.75- 4.00
Black stockings	4.25- 4.50
Lace curtains	9.25- 9.50
Cotton canvas, No. 1	5.50- 6.00
White cotton batting	4.50- 4.75
Roofing, No. 1	2.20- 2.40
Roofing, No. 2	2.10- 2.20

Rope and Bagging

In conjunction with most kinds of papermaking raw material, old rope and bagging have eased off in value to an extent, and the market exhibits a soft tone. Current buying by mills is light because a majority of manufacturers have covered present requirements through recent purchases, and this, too, being the season when papermakers confine their purchasing to material immediately needed. Rope values are relatively firmer than those of scrap bagging. No. 1 Manila rope is moving into consuming channels at around 7 cents per pound at shipping points and most dealers report having an outlet for the bulk of the supply coming their way. Demand for bagging is of unimportant character and buyers are enabled to acquire supplies at much their own figures. No. 1 scrap is quoted at 2.75 cents a pound and less, No. 1 gunny at 3 cents and roofing bagging at 1.50 cents. Leading consumers are keeping almost entirely out of the market. Quotations are:

	New York and Chicago.
Gunny, No. 1 domestic	3.00-3.25
Gunny, No. 1 foreign	3.00-3.25
Scrap bagging, No. 1	2.60-2.80
Roofing bagging	1.50-1.65
Wool tares, heavy	3.50-3.75
Wool tares, light	3.25-3.50
Manila rope, No. 1 foreign	7.00-7.25
Manila rope, No. 1 domestic	7.00-7.50
Sisal strings	3.25-3.50
Mixed strings	3.00-3.15

PAPER RAGS

SAVE MONEY

Consult a Specialist for Your Requirements Who Can Supply Your Demand

MARTIN SPINELLI
Paper Manufacturers' Supplies
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Wire at my Expense for Quotations on 100 or 1000 Tons for Quick Deliveries

BAGGING

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ROPE

Paper Stock

Making Good With the Mills

If you are interested in

Big Tonnage
Fulfillment of Delivery Promises
A Clean, Well-Packed, Uniform Product
Forty Different Grades of Paper Stock

you will want the benefit of a connection with the largest graders of paper stock exclusively in the Middle West.

For 35 years this organization of Paper Stock Specialists has made good with the mills by standing behind its product with its full resources.

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Write us your wants and we'll be glad to tell you what we have to offer you

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Old Papers

Largely on account of the scarcity of wood pulp, demand for waste paper rules quite active and prices are not only maintained but in some instances values have undergone additional enhancement. Mills are absorbing supplies in steady fashion, and, on the whole, are taking appreciably large tonnages of stock out of the market, with the result packers and dealers are asking high prices and in most cases are receiving the figures wanted. With the possible exception of such grades as white news cuttings and overissue newspapers, there is no shortage of old paper, yet demand is running at a rate where practically all the supply offered is readily absorbed, while dealers assert that should consumers increase their buying ever so little present supplies would not prove ample.

One of the largest news print manufacturers in the East has been a heavy buyer of folded newspapers, presumably for de-inking to be used in place of ground wood, and prices on this grade of paper have sharply advanced, sales being recorded at 2.30 cents and more per pound at shipping points. White news cuttings have sold at 6 cents a pound at better, overissue newspapers at 2.50 cents and No. 1 mixed paper at 2 cents. Quotations on shavings are higher at 7.25 to 7.50 cents for No. 1 soft white and 8 to 8.25 cents for No. 1 hard white shavings. Kraft and manila papers are quotably steady. Books have been in little call but demand is commencing to broaden. Prices f.o.b. shipping points follow:

	New York and Chicago.
Hard white shavings, No. 1	8.00-8.25
Hard white shavings, No. 2-3	7.00-7.25
Soft white shavings	7.25-7.50
Colored shavings	5.00-5.25
Heavy book, No. 1	3.25-3.50
Crumpled, No. 1	2.75-3.00
Ledger stock	4.00-4.25
Kraft, No. 1	5.25-5.50
Manilas, No. 1	3.00-3.25
White blank news	6.00-6.50
Overissue news, No. 1	2.50-2.60
Folded news	2.25-2.35
Mill wrappers	2.15-2.25
Box board cuttings	2.10-2.20
Mixed paper, No. 1	2.00-2.10
Common paper	1.50-1.60

Chemical Pulp

Demand for chemical wood pulp has undergone recession customary for the mid-summer and yet the market evinces a strong tone and prices show no signs of easiness; on the contrary, such fluctuations as have occurred have been in an upward direction. The real factor in this situation is that producing mills are sold ahead and have but scant lots of pulp

We are prepared to deliver promptly
in any desired quantity
the following:

Auramine	Bismarck Brown
Basic Green	Pulp Colors
Chrysoidine R	Vegetable Tallow
Chrysoidine Y	Casein
Methyl Violet	Soda Ash
Orange	Caustic Soda
Basic News Blue	Bleaching Powder
Stearate of Calcium	Stearate of Alumina

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All Grades of PAPER and BOARDS

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Established 1870

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Agents for The Riverton Paper Company, Inc., Riverton, Conn. Manufacturers of light weight specialties.

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PAPER

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Paper Makers' Supplies

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Special Attention Called to Our Own Packing and Assortment

Ticonderoga Machine Works
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MANUFACTURERS OF
WARREN IMPROVED CALENDER DOCTORS
With Flexible Blades, Universal Adjustment and Control
(PATENTED)
WARREN IMPROVED PATENT DOUBLE DRUM WINDERS
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Stock Circulating Systems *and*
other Paper Mill Specialties
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Have 3½ times the efficiency of other beaters in use today for Beating, Brushing and Refining Paper Stack?

For Increased Production, Greater Economy, Stronger, Finer, More Uniform Pulp, the CLAFLIN CONTINUOUS BEATERS will more than satisfy.

Ask Us for Our New Catalogue

THE CLAFLIN ENGINEERING COMPANY
LANCASTER, OHIO
The Canadian Fairbanks-Morse Company, Limited Agents for Dominion of Canada.

Bleached and Unbleached
WOOD PULP
of Every Description
M. GOTTESMAN & COMPANY
INCORPORATED
18 East 41st Street NEW YORK, N. Y.
Established 1886

to dispose of in the open market, so that the quieter demand from transient buyers has but slight influence on values. Sulphite of every grade is equally as difficult to find available in sizable tonnages today as at any time in the past few months. Manufacturers have contracted for practically their entire output over the remainder of the year, and buyers seeking spot supplies have but few sources to choose from and therefore are obliged to meet full quoted prices. Moreover, present indications are that values will rise to new high levels when papermakers resume buying on a livelier scale as they usually do in the autumn. There are no evidences of supplies increasing, and if demand broadens, higher prices seem inevitable.

Spot tonnages of bleached sulphite, when found available, readily bring 12 cents upward per pound at pulp mills. News print sulphite is commanding 8 to 8.50 cents in the open market, and consumers are reported freely contracting for forward shipments at a cent per pound under these figures. Domestic kraft pulp of No. 1 quality is selling at 7.50 to 7.75 cents, and soda pulp is nominally quotable at 8.50 to 9 cents. F.o.b. producing mills quotations on domestic pulps are:

Bleached sulphite	12.00-14.00
Easy bleaching sulphite	10.00-10.50
News grade sulphite	8.00- 8.50
Soda pulp, bleached	8.50- 9.00
Mitscherlich unbleached	9.00- 9.50
Kraft, No. 1	7.50- 7.75
Screenings, refined	3.00- 3.50

Mechanical Pulp

The situation in mechanical wood pulp is marked by an exceedingly tight supply condition. Available stocks, insofar as concerns sizable tonnages, are well nigh a misnomer. Grinders have virtually nothing to offer, their output for months ahead being almost wholly contracted for, and transient buyers are obliged to pay unprecedented prices for the few scattering lots coming into the market. As high as $165 per ton has been realized for spruce ground wood of prime quality for prompt delivery, and $150 and $155 are freely bid for spot parcels. Some mechanical pulp imported from Scandinavian countries is being offered at around $140 per ton ex dock. As would be expected under prevailing circumstances, demand is of a pointed character and most of that from the transient trade is going unfilled.

Chemicals

Aside from several lines which are somewhat scarce, pulp and papermaking chemicals are in a bit quieter demand than they have been, but quotations are generally maintained and producers are kept busily engaged in filling back commitments. Bleaching powder is actively sought and is readily fetching

Largest producers in the world of highest grade Brimstone —guaranteed 99% pure—free of Arsenic and Selenium.

The
UNION SULPHUR COMPANY

In so far as possible we will be glad to offer advice or suggestions to prospective buyers who are using or may be contemplating the use of brimstone.

17 BATTERY PLACE
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Washed Clay

¶ Are you receiving all the Clay you need and the grade that you want? Or are you accepting any old grade just so long as you can get delivery.

¶ Our customers are receiving the same grade as usual and we are not seriously embarrassed by shortage.

¶ We are in a position to give this same Service to you.

Because—

QUANTITY: Largest production in United States.

QUALITY: Lowest grit and moisture contents of any clay, domestic or foreign.

DELIVERIES: Reserve stock always on hand.

PLANTS: Three huge plants at McIntyre, Ga., under direct control of Edgar Bros. Co., also Saylorsburg, Pa., and Gordon, Ga.

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FRANCIS HUGHES COMPANY

Paper Mill Supplies

CORRESPONDENCE SOLICITED

Private Switch on C. B. & Q. Tracks

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Main Paper Stock Co.
Incorporated
PACKERS OF WASTE PAPER STOCK
Old and New Rags, Bagging, Strings, Etc.

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Canadian and American Connections

Invincible Paper & Pulp Corp.
A. GEORGE LUTZ, President
135 Broadway New York City
Phone Rector 9957.

6 cents a pound for spot shipment in domestic drums. Brimstone is quotably steady at $18 to $20 per ton at mines. Quotations follow:

Alum, lump ammonia	4.25- 4.50
Alum, lump starch	8.50- 9.00
Alum, powdered	4.75- 5.00
Blanc fixe, powdered	5.00- 5.50
Bleaching powder (domestic drums)	6.00- 6.25
Brimstone (ton)	18.00-20.00
Casein	14.00-16.00
Caustic soda, spot delivery	6.50- 6.75
China clay, domestic, washed	10.00-13.00
China clay, foreign	18.00-24.00
Rosin, grade E	18.75-
Satin white	2.75- 3.00
Soda ash, 58 per cent light (bags)	3.25- 3.50
Sulphite of alumina, commercial grade	2.75- 3.00
Starch, Globe, in bags	5.47-
Talc (ton)	18.00-20.00

Albany Felt Co. Adds to Building

Work has been started upon a considerable addition to the mill of the Albany Felt company in Albany, N. Y. When completed, November 1 next, the increased facilities will give employment to many more people in the northern part of that city.

The plans call for a three story brick, mill-construction edifice, 273 feet eight inches long, and eighty-five feet two inches wide, with an unfinished basement. The framework will be steel girders, and the roof of tar and gravel. The construction will be an extension of the present mill building to the north. Work was begun on June 25 and good progress is now being made.

The extension, when completed, will be used to augment the manufacturing facilities of the Albany Felt Company's fast growing business. This company has built an enviable reputation since it was established on a small scale in July, 1895.

The new mill of the Internatinoal Paper Company at Three Rivers, Quebec, is expected to be ready to start operations about November 1 next with an initial estimated output of 80 tons of sulphite daily. This pulp will be shipped to the various mills of the company in the United States and Canada. Eventually it is planned to manufacture news print at the Three Rivers plant though this is not expected to materialize until the fall of 1921.

The Japan Paper Company, importers of fancy papers, of 109 East Thirty-first street, New York, has increased its capital from $150,000 to $250,000.

The Miner-Edgar Company, dealers in papermakers' clays, has moved its New York office from the Hudson Terminal Building, 30 Church street, to 110 William street.

STANDARD BLEACHING POWDER

Manufactured by

Pennsylvania Salt M'f'g Co.
PHILADELPHIA, PA.

Have You Tried Cotton Linters for Paper Stock?

It Will Pay You to Figure With Us

Our organization covers the South

Steele By-Products Co., Inc.
DEALERS IN
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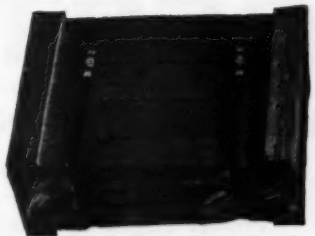
SIGNODE SYSTEM



Framed Reams, strapped with Signode System

Signode straps insure delivery of framed paper bundles in the same condition they leave the mill. Cheaper than rope. No battered corners. Liberal trial arrangement.

Write for Particulars and Prices

The Signode System, Inc.
564 W. Adams Street CHICAGO, ILL.

ESTABLISHED 1892

Vito G. Cantasano & Bros.

PACKERS AND WHOLESALE DEALERS

PAPER STOCK, COTTON AND WOOLEN RAGS.

395 PEARL STREET
54 VANDEWATER ST

OFFICE: 185 SOUTH STREET

353 WATER STREET
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NEW YORK

A. SALOMON, Inc.

EMANUEL SALOMON, President

15 Park Row *New York*

Paper Makers Supplies

SOLE AGENTS U. S. *and* CANADA *for*

GASTON CAHEN & CO. *Ghent, Belgium*

J. ROZES AINE *Agen, France*

JEAN SOULIER *Rouen, France*

LEON MOIRAND *Annonay, France*

RUSS GELATIN CO.

Factory—WESTFIELD, MASS.

MANUFACTURERS OF

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ANIMAL SIZING GLUE STOCK

LARGEST SPECIALISTS IN AMERICA ON

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Alum

(BOTH COMMERCIAL and FREE FROM IRON)

Casein, Satin White, English China Clay, Crystal Boro Phosphate

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THE WORLD'S BEST FILLER

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Finest White Color Natural Fiber Retention 90%

Every Way Superior to Clay

Prompt Shipments Guaranteed—Largest Mills in the World

INTERNATIONAL PULP CO., 41 Park Row, New York

New Papers

Writing—	
White rag	35-60
White sulphite, No. 1	18-30
Colored	20-35
Ledger—	
White rag	35-65
White sulphite	22-40
Colored sulphite	22-
Colored rag	32-
Bonds—	
White rag	25-60
White sulphite	18-35
Colored sulphite	20-35
Colored rag	26-60
Book—	
No. 1 S. & S. C	19.00-20.00
Machine finished	17.00-18.00
English finished	18.00-20.00
Coated and enameled	21.00-22.00
Lithograph, M. F	21.00-22.00
News Print—	
Rolls, contract	5.50- 6.00
Rolls, transient	12.00-
Sheets	12.00-13.00
Side runs	7.00-
Cover Stock—	
Coated, both sides	12.25-
Coated, one side	12.20-
Wrappings—	
No. 1 kraft	12.00-13.00
No. 2 kraft	11.00-12.00

Boards—	New York and Chicago
Solid news	125.00-135.00
Straw	100.00-110.00
Plain chip	115.00-120.00
White coated chip	130.00-140.00
Manila coated chip	125.00-135.00
Binders' boards	140.00-150.00

Charles Borland, vice president of the Fort Orange Paper Company, Castleton-on-the-Hudson, N. Y., has resigned and has been succeeded by Weston W. Goodnow, who has been elected senior vice president. Gordon W. Latham has been elected junior vice president.

The Pulp and Paper Trading Company, of 21 East Fortieth street, New York, has increased its capital from $100,000 to $500,000.

News Personals

Charles W. Rantoul, long an active personage in the pulp and paper industry, is now associated with the Perkins-Goodwin Company, paper and paper mill supplies dealers and agents of 33 West Forty-second street, as manager of the pulp department and as a director of the company. Since 1904 Mr. Rantoul has been at the head of the C. W. Rantoul Company, of New York, specializing in kraft papers, and since 1916 he also has been the active head of the Clement & Stockwell Paper Company, paper jobbers of New York. In 1913, Mr. Rantoul organized the Nilsen-Rantoul Company, Inc., of New York, wood pulp dealers and importers, and served as vice president of this concern until recently when he sold his interests and severed his connection with the concern. During his early days in the industry, Mr. Rantoul was with the Train-Smith Company, of Boston, and later with the Ticonderoga Pulp and Paper Company. He built the Imperial Paper Mills at Sturgeon Falls, Ont., during 1902 and 1903.

Victor H. Polachek, publisher of the Sun and New York Herald and the New York Evening Sun, has resigned his connections with the Frank A. Munsey's newspaper organization to enter the news print manufacturing field and has associated himself with a project for the manufacture of sulphite pulp and news print paper. Details of the new project are expected to be announced soon. Mr. Polachek is one of the best known newspaper publishers in the country, and his severing of his connections in the publishing line to become a paper manufacturer has caused no little comment in the trade.

E. Salomon, president of A. Salomon, Inc., importers of and dealers in papermakers' supplies of 15 Park Row, New York, has returned from France after spending a month or longer on the other side of the Atlantic studying rag market conditions.

The Main Paper Stock Company, packers of papermakers' supplies of New York, has removed its offices from 25 Peck Slip to the Staats-Zeitung Building, corner William and Spruce streets, New York. The general offices of the concern occupy an entire floor of the building. The new location is much more convenient than the former, and the new offices are fitted up in elegant style.

SALOMON BROS. & CO.

Importers and Exporters of

Cotton, Cottonwaste, Linters, Ramie, Jute, Rubber

Import of All Grades of Rags and Rope

200 Fifth Ave.. NEW YORK

J. ANDERSEN & CO.

FREDERICK BERTUCH, SPECIAL PARTNER
21 East 40th Street, New York City

Importers of Chemical Pulps
BLEACHED AND UNBLEACHED

Agents for Kellner Partington Paper Pulp Co., Ltd.
Sarpsborg, Norway; Forshaga, and Edsvalla, Sweden;
Bergvik and Ala Nya Aktiebolag, Söderham, Sweden

30 Years Exporting American Paper

Our Markets: The World outside of U. S. A. and Canada.
Our Organization: Ten selling offices, besides salaried travellers and local representatives.
Our Demand: An established clientele, constantly being increased, by an aggressive sales policy.
Our Supply: **Your Mill?**
Present conditions in America are temporary.
Have you considered what a first-class export outlet would mean to you, with its assurance of steady demand?

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We are Manufacturers and Exporters of

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also Importers and Jobbers

MAURICE O'MEARA CO.
448-50 Pearl Street NEW YORK CITY

E. J. KELLER COMPANY
INCORPORATED
200 FIFTH AVENUE
NEW YORK

FOREIGN AND DOMESTIC
PAPER MAKERS' SUPPLIES
COTTON, JUTE AND FLAX WASTES
COTTON BAGGING MATERIALS
EAST INDIA MERCHANDISE

DANIEL M. HICKS
(INCORPORATED)
IMPORTERS-DEALERS
ESTABLISHED 1895

Foreign and Domestic
Rags, Bagging, Rope and Waste Paper

200-5th AVENUE, NEW YORK CITY

Chemical Pulp

Following a short lull during which the market held firm but quotably unchanged, prices of Scandinavian wood pulp are again on the rise, and importers say that nearly every quotation received from Norway and Sweden at present shows a further advance. Producers of pulp on the other side are in a very independent position as regards the American market. Most Scandinavian mills are sold ahead for the balance of the year and there is a large potential demand in Europe that remains unfilled, while prices consumers are paying on the other side are considerably beyond a parity with domestic pulp values here, with the result that but few offerings of pulp of any kind are being made to buyers in the United States. Import concerns are confining their operations almost entirely to placing contracts for the account of customers, none of them being willing to purchase supplies on their own behalf at prevailing high prices. There are no visible signs that shipments of pulp from Scandinavia to America are likely to increase between now and when the Baltic closes in November, chiefly for the reason that available stocks are lacking on the other side and also because higher prices are being obtained by Scandinavian producers from European customers. Nominal quotations on unbleached sulphite of No. 1 quality are at a minimum of 10.50 cents per pound, on foreign kraft pulp at 8.00 to 8.25 cents and on bleached sulphite from 15 cents upward. Receipts at New York during July and nominal quotations follow:

Bleached sulphite	$15.00-
Unbleached sulphite, No. 1	10.50-11.00
Easy bleaching	11.00-11.50
Mitscherlich unbleached	11.00-11.50
Kraft	8.00- 8.25

Equitable Trust Co., 217 bls. from Hango; Brown Bros. & Co., 7,925 bls. from Hamburg; Perkins-Goodwin Co., 925 bls. from Gothenburg; E. M. Sergeant & Co., 175 bls. from Gothenburg; Fred Enders & Co., 492 bls. from Gothenburg; Scandinavian-American Trading Co., 3,378 bls. from Gothenburg; New York Oversea Co., 300 bls. from Christiania; J. Andersen & Co., 750 bls. from Christiania; Corin Bros., 2,500 bls. from Gothenburg Penn Export Corp., 1,600 bls. from Trieste; U. S. Forwarding Co., 9,141 bls. from Trieste; A. J. Pagel & Co., 1,800 bls. from Gothenburg; American Woodpulp Corp., 1,250 bls. from Gothenburg; Tidewater Paper Mills Co., 17,224 bls. and 812 tons of ground wood from Liverpool, N. S.; Order, 2,400 bls. from Gothenburg. At Boston: Lagerloef Trading Co., 10,085 bls. from Finland.

Paper Stock

Arrivals of paper stock continued fairly heavy during July on back orders, but indications are that the decline in the papermaking materials market here has brought fresh buying very nearly to a standstill, European merchants demanding prices so far above domestic values in the United States that consumers and importers in this country have stopped buying for a time. Advices say that dealers on the other side look for a higher market here in the fall than now prevails and this evidently accounts for the holding of stock at figures which buyers on this side refuse to grant at present. Receipts of roofing rags were exceptionally voluminous during the past month, while bagging and rope are coming in from foreign sources in steady amounts. Arrivals at New York in July were as follows:

Old Rope

Irving National Bank, 63 bls. from Barcelona; United Fruit Co., 9 bls. from Cristobal; International Purchasing Co., 1,186 coils from Hull, 156 coils from Bristol, 55 coils from Christiania, 41 bls. from Marseilles, 56 bls. from Rotterdam, 5 bls. from Copenhagen; Old Colony Trust Co., 98 coils from Hull, 305 coils from Bristol, 101 bls. from Havre; W. Schall & Co., 241 coils from Hull; Edwin Butterworth & Co., 140 bls. from Antwerp; W. H. Cummings & Sons, 333 coils from Gothenburg; Ladenburg, Thalman & Co., 238 bls. from Gothenburg; Guaranty Trust Co., 120 bls. from Christiania; Equitable Trust Co., 159 bls. from Antwerp; E. J. Keller Co., 213 bls. from Gothenburg, 167 bls. from Rotterdam; First National Bank of Boston, 92 bls. from Rotterdam; Chemical National Bank, 84 bls. from Rotterdam; Parsons & Whittemore, 94 coils from Leith.

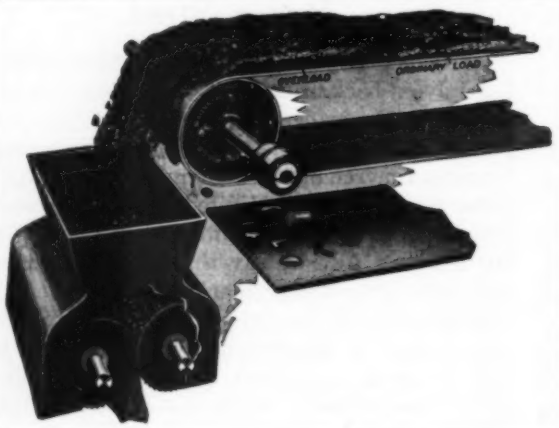
Old Bagging

Brown Bros. & Co., 156 bls. from Antwerp; Ladenburg, Thalman & Co., 97 bls. from Rouen; Wilkinson Bros. & Co., 109 bls. from Hull; Mechanics & Metals National Bank, 271 bls. from Rotterdam; First National Bank of Boston, 232 bls. from Antwerp, 62 bls. from London; Munson Steamship Line, 32 bls. from Leith; Atlantic National Bank, 218 bls. from Antwerp; Equitable Trust Co., 312 bls. from Antwerp; Comptoir National d'Escompte, 68 bls. from Ant-

MAGNETIC PULLEYS

"HIGH DUTY"

Are the only positive safeguard to prevent Nails, Pins, Pieces of Broken Machinery, etc., from getting into your stock



All paper stock should be run over one of our Magnetic Separators before going to the dusters. This would remove everything in the shape of metal, and thereby prevent these pieces from going into the stock, which cause considerable trouble, and ruined wires or felts.

Let us tell you more about the advantages of using one of these machines

Magnetic Mfg. Co.
766 Windlake Ave., Milwaukee, Wis.

YOUR PRODUCTION!

$$P = \frac{WTS}{600} - B$$

P=Production of salable paper in lbs. per hour.
W=Weight in lbs. of one ream (24 x 36-500).
T=Trim of paper in inches.
S=Speed of machine in feet per minute.
B=Lbs. per hour of paper lost in breaks or made unfit for sale.

Of the factors in the above formula by which you can determine YOUR production, T and W are fixed at predetermined values. But the values of S and B are variable and depend upon the equipment of the machine. Suction Rolls increase S and almost entirely eliminate B. The value of P then becomes much greater. Isn't that what YOU desire?

The Sandusky Foundry & Machine Co.
Sandusky, Ohio

werp; E. J. Keller Co., 146 bls. from Christiania, 120 bls. Genoa, 885 bls. from Marseilles; National City Bank, 368 bls. from Christiania, 49 bls. from Antwerp; R. F. Downing & Co., 96 bls. from Antwerp; W. Van Doorn, 124 bls. from Rotterdam; Assistant Purchasing Agent of Panama Canal, 79 bls. from Colon; Old Colony Trust Co., 70 bls. from Barcelona; Order, 151 bls. from Rouen, 1,300 bls. from Antwerp, 37 bls. from Gothenburg, 41 bls. from London.

Rags

Castle, Gottheil & Overton, 638 bls. from Bordeaux, 179 bls. from Rotterdam, 9 bls. from Antwerp; Albion Trading Co., 15 bls. from Bordeaux; R. Goldstein & Son, 162 bls. from Bordeaux, 170 bls. from Havre, 96 bls. from Rotterdam; E. J. Keller Co., 24 bls. from Bordeaux, 222 bls. from Christiania, 508 bls. from Rotterdam, 520 bls. from Barcelona; Maurice O'Meara Co., 305 bls. from Bordeaux, 310 bls. from Rotterdam; O. Mercer & Co., 26 bls. from Bordeaux; E. Gross & Co., 1,130 bls. from Rotterdam; Salomon Bros. & Co., 951 bls. from Rotterdam; Sanderson & Co., 81 bls. from Antwerp; E. E. Marks & Co., 30 bls. from Bordeaux; S. Rubens & Bros., 139 bls. from Rotterdam; Parsons & Whittemore, 2,291 bls. from Rotterdam, 42 bls. from Havre, 106 bls. from Leith; W. Hughes & Co., 869 bls. from Rotterdam, 25 bls. from Belfast, 73 bls. from Havre; Middleton & Co., 152 bls. from Antwerp; A. Katzenstein, 17 bls. from Antwerp; Atterbury Bros., 212 bls. from Havre; Wilkinson Bros. & Co., 176 bls. from Havre, 243 bls. from Rotterdam; Paul Berlowitz, 363 bls. from Havre; Edwin Butterworth & Co., 57 bls. from Havre; A. Salomon, Inc., 167 bls. from Havre; Jaffe & Co., 331 bls. from Rotterdam; Gatti-McQuade Co., 223 bls. from Rotterdam; S. Silberman & Co., 42 bls. from Rotterdam; Old Colony Trust Co., 77 bls. from Havre; Equitable Trust Co., 300 bls. from Trieste, 481 bls. from Antwerp, 179 bls. from London, 179 bls. from Rouen, 223 bls. from Hamburg; American Foreign Banking Corp., 19 bls. from Bordeaux, 25 bls. from Antwerp, 86 bls. from Havre; National City Bank, 160 bls. from Rouen, 92 bls. from Havre, 1,229 bls. from Antwerp; Citizens National Bank, 70 bls. from Hull, 948 bls. from Antwerp; New Netherland Bank, 983 bls. from Antwerp; Standard Bank of South Africa, 255 bls. from Antwerp; First National Bank of Boston, 459 bls. from London, 384 bls. from Bristol, 102 bls. from Rotterdam; Irving National Bank, 18 bls. from Antwerp, 58 bls. from Rotterdam; Mechanics & Metals National Bank, 205 bls. from Antwerp; Guaranty Trust Co., 36 bls. from Antwerp; Bank of New York, 66 bls. from Antwerp; Atlantic National Bank, 69 bls. from Antwerp, 47 bls. from Havre; Brown Bros. & Co., 890 bls. from Antwerp; Goldman, Sachs & Co., 383 bls. from Bordeaux, 953 bls. from Antwerp, 87 bls. from Havre; Ladenburg, Thalman & Co., 468 bls. from Rouen, 99 bls. from Hamburg, 227 bls. from Antwerp, 158 bls. from

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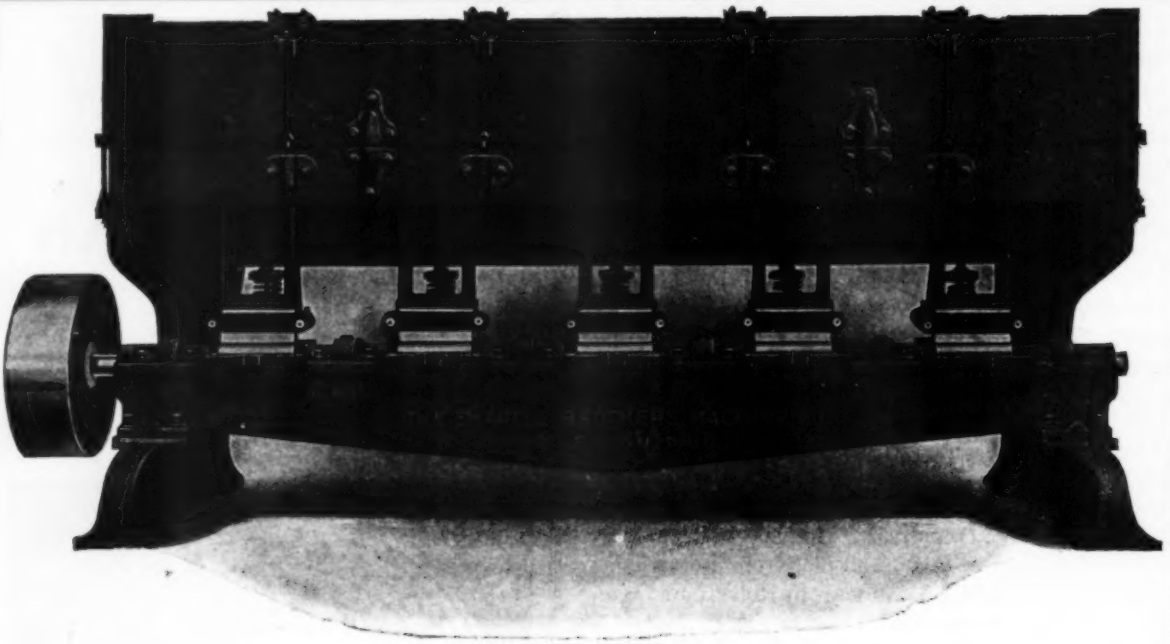

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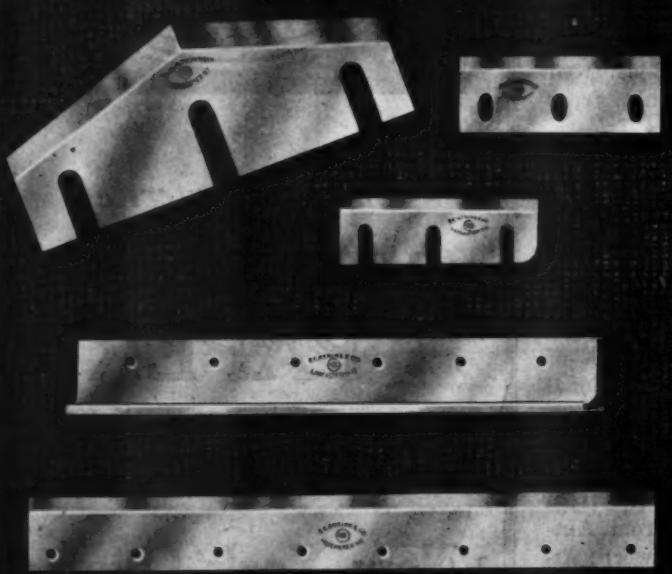

The Demand for Maximum Production

is answered by the superior performance of

Atkins Silver Steel

Barkers, Chippers, Cutters and Planers.

Their excellent material, temper and workmanship assures you of knife satisfaction and we solicit a trial for them.

Write for our Machine Knife Booklet.

E. C. ATKINS & COMPANY, Inc.

Home Office and Factory: INDIANAPOLIS, IND. *Machine Knife Factory:* LANCASTER, N. Y.

Havre, 77 bls. from Rotterdam; Davies, Turner & Co., 674 bls. from Antwerp; W. Schall & Co., 590 bls. from Antwerp, 408 bls. from Havre; W. Van Doorn, 90 bls. from Rotterdam; American Express Co., 50 bls. from Bordeaux, 903 bls. from Antwerp; Patent Vulcanite Roofing Co., 256 bls. from Antwerp; Arrowhead Mills, 260 bls. from London; R. F. Downing & Co., 506 bls. from Barcelona; Order, 341 bls. from Trieste, 597 bls. from London, 1,716 bls. from Antwerp, 3,927 bls. from Bordeaux, 67 bls. from Hamburg, 10 bls. from Rouen, 2,632 bls. from Havre, 186 bls. from Barcelona, 81 bls. from Liverpool, 461 bls. from Rotterdam, 51 bls. from Gothenburg.

Miscellaneous Paper Stock

Mechanics & Metals National Bank, 286 bls. from Antwerp; New Netherland Bank, 634 bls. from Antwerp; L. H. Abenheimer, 93 bls. from Antwerp; E. J. Keller Co., 244 bls. from Belfast, 82 bls. from Antwerp; Castle, Gottheil & Overton, 13 bls. from Belfast, 459 bls. from Rotterdam; Irving National Bank, 39 bls. from Leith; American Exchange National Bank, 374 bls. from Belfast; W. Hughes & Co., 37 bls. from Manchester; National City Bank, 185 bls. from Antwerp, 225 bls. from London; Jaffe & Co., 208 bls. from Rotterdam; Northern Metals Selling Co., 324 bls. from Rotterdam; Gotham Paper Stock Co., 50 bls. from Rotterdam; W. Van Doorn, 1,577 bls. from Rotterdam; Main Paper Stock Co., 214 bls. from Rotterdam; Gatti-McQuade Co., 1,033 bls. from Rotterdam; Bartley Mfg. Co., 116 bls. Rotterdam; Dallas Waste Mills, 303 bls. from Rotterdam; George W. Millar & Co., 712 bls. from Rotterdam; I. Kaufman & Son, 98 bls. from Rotterdam; Heidelbach, Ickelheimer & Co., 410 bls. from Rotterdam; Bankers Trust Co., 433 bls. from Rotterdam; Garfield National Bank, 129 bls. from Rotterdam; Maurice O'Meara Co., 29 bls. from Manchester; First National Bank of Boston, 187 bls. from Manchester, 46 bls. from Glasgow; Guaranty Trust Co., 136 bls. from Glasgow; Order, 172 bls. from Havre, 55 bls. from Liverpool, 60 bls. from Leith.

Paper

Large consignments of cigarette paper are being received from France, which, together with hanging and printing paper, constitutes the bulk of paper coming into the United States from foreign countries. One of the large tobacco companies alone imported over 3,000 cases of cigarette paper within the last month. Fair-sized amounts of news print from Scandinavia are being imported and are finding ready buyers here. Receipts at New York in July follow:

Cigarette

American Tobacco Co., 3,000 cs. from Bordeaux, 328 cs from Havre; Duke & Sons, 30 cs. from Bordeaux; Equitable Trust Co., 80 cs. from Bordeaux; R. J. Reynolds Tobacco Co., 450 cs. from Bordeaux; P. J. Schweitzer, 125 cs. from Bordeaux, 310 cs. from Havre, 13 cs. from Genoa; D. H. Bain & Co., 10 cs.

PAPER MILLS

WE have a selling capacity twice our supply, and are in the market for paper in large volume, and would like to hear from you.

Our competent selling organization has from the beginning always demanded an ever increasing supply. We are at present all sold up and looking around for more, and are now in the market for five thousand tons in several grades.

We would be glad to hear from you what tonnage you can give us during this year. Write us.

Interstate Pulp & Paper Co., Inc.
Grand Central Terminal, New York City

The
C. L. LaBOITEAUX CO.
Cincinnati Chicago Cleveland New York

TRADE MARK L X QUALITY SERVICE

PAPER BOX BOARDS
— FOR —
Folding Boxes, Set Up Boxes, Paper Cans, Shipping Containers, Etc.

Plain Strawboard
News Lined Strawboard
Book Lined Strawboard
Plain and Lined Chip Board
Single and Double Manila Lined News and Chip Board
Patent Coated Folding Box Board
Clay Coated Folding Box Board
Solid Manila Tag Board
Brown Jute Box Board
Oak Grained Jute Box Board
Marble Grained Jute Box Board
Pasted Container Board
Bristol Ticket Board
Diamond Wall Board
Champion All Leather Heel Board
Also other standard and special grades to order

FRANK F. ALT
LA FAYETTE, INDIANA

Converter of Paper Mill Felts into finished Bed Blankets and Auto Robes at the nominal charge of $1.50 per blanket or robe, except press felts, which are $1.75 per blanket or robe.

We cut, wash, renap, bind and pack for reshipment at the above prices in the natural color of felt, and in any quantity for mills or individuals. For dyeing any other color we charge 40 cents per pound extra. dry weight after material is washed.

Special Price for Quantity.

Ship your felts express, freight or parcel post, prepaid to
421 Columbia Street, La Fayette, Ind.

SCREEN PLATES *and* DANDY ROLLS

Watermarking a Specialty

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Langley, S. C.
St. Austell, Eng.

Just a Word with the Superintendent

THERE are many things you could teach us and it is also barely possible we can be of some service to you. Quality cannot always be gauged by size it is true, but when it comes to ROSIN SIZE, we feel that as its largest manufacturers we may possibly be able to help you somewhat in an advisory capacity. We manufacture ROSIN SIZE for use direct to beaters or via Emulsifying systems. If interested in the latter, we shall be glad to furnish you specifications and drawings absolutely free, which will enable you to install your own system at very moderate cost.

PAPER MAKERS CHEMICAL CO.
Easton, Pa.; Holyoke, Mass.

WESTERN PAPER MAKERS CHEMICAL CO.
Kalamazoo, Mich.

Factories
Easton, Pa.
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EASTERN PAPER MAKERS CHEMICAL CO.
Watertown, N. Y.

Factories
Kalamazoo, Mich.
Watertown, N. Y.

The "Hamilton" Felt
is making records that we are proud of on many paper machines.

A trial is invited

SHULER & BENNINGHOFEN
HAMILTON, OHIO

Waterproof Case Lining

Protects your Shipments from damage by moisture while in storage or transit

NATIONAL DUPLEX
TRADE MARK

We can supply National Duplex Waterproof Case Lining in either rolls or sheets

WE ALSO MAKE WAX PAPERS, ALL WEIGHTS, IN SHEETS OR ROLLS

Write for Samples

National Waterproofing Co. Drexel Bldg. **Philadelphia, Pa.**

from London; J. Victory & Co., 2 cs. from Barcelona; Southern Sales Co., 2 cs. from Barcelona; Schunes Co., 10 cs. from Barcelona; Chatham & Phenis National Bank, 6 cs. from Havre; National City Bank, 10 cs. from Bordeaux; Liggett & Myers Tobacco Co., 30 cs. from Havre; Surbrug Co., 15 cs. from Havre, 4 cs. from Southampton; Rose & Frank Co., 190 cs. from Havre, 20 cs. from Southampton; C. Drucklieb, 10 cs. from Havre; Bankers Trust Co., 43 cs. from Havre; Huttlinger & Struller, 83 cs. from Marseilles; W. R. Grace & Co., 21 cs. from Barcelona; Order, 2 cs. from Hamburg, 4 cs. from Rotterdam.

Printing

Agros Corp., 2,533 rolls from Hango; Globe Shipping Co., 294 cs. from Hamburg; Penn Export Corp., 431 bls. from Rotterdam; B. F. Drakenfeld & Co., 46 cs. from Liverpool; Oxford University Press, 14 cs. from Liverpool; Central Leather Co., 99 bls. from Liverpool; New York Oversea Co., 978 rolls from Christiania; Order, 53 cs. from Antwerp.

Wrapping

C. A. Stern & Co., 240 bls. from Bremen; Smythe Co., 70 bls. from Hamburg; Order, 770 rolls and 131 bls. from Gothenburg.

Hanging

R. F. Downing & Co., 23 pkgs. from London; W. H. S. Lloyd & Co., 103 bls. from London; B. F. Drakenfeld & Co., 6 cs. from Liverpool; A. C. Dodman, Jr., 90 bls. from Liverpool, 5 bls. from Antwerp; American Shipping Co., 17 bls. from London; A. Murphy & Co., 2 bls. from Havre, 5 bls. from London; Prager Co., 11 cs. from Antwerp; R. F. Lang, 35 pkgs. from London.

Filter

J. Manheimer, 90 bls. from Bordeaux; E. Fougera & Co., 32 cs. from Bordeaux; Orbis Products Trading Co., 27 bls. from Bordeaux; Lunham & Moore, 37 cs. from London; Zinkeisen & Co., 50 bls. from Hamburg; C. G. Euler, 5 bls. from Bordeaux; E. M. Sergeant & Co., 2 cs. from London.

Tissue

R. Hoe & Co., 4 bls. from London; Davies, Turner & Co., 6 cs. from Liverpool.

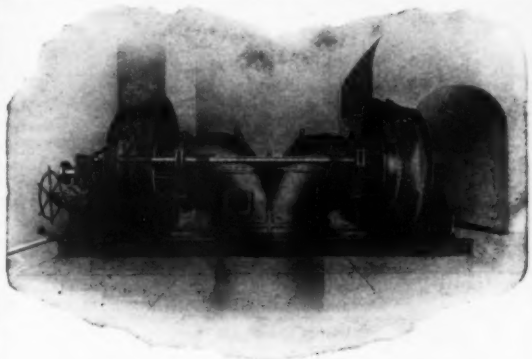
Drawing

Lunham & Moore, 22 cs. from London; Keuffel & Esser Co., 58 cs. from Hamburg.

Miscellaneous

Abe Kobei & Co., 50 bls. strawboard from Tientsin; Maurice O'Meara Co., 246 rolls from Gothenburg; F. B. Vandergrift & Co., 14 cs. from Southampton; Roessler & Hasslacher Chemical Co., 164 cs. from Hamburg; A. Frank & Co., 4 cs. from Hamburg; P. G. Myers, 4 cs. from Hamburg; C. B. Richard & Co., 2 bls. from Hamburg; Lord & Taylor, 3 cs. from Havre; M. J. Corbett & Co., 3 cs. from Havre; Kronfeld, Saunders & Co., 3 cs. from Havre; Koons, Wilson & Co., 3 cs. from Liverpool; Shitzkin Bros., 2,935

SMITH
HYDRAULIC TURBINES



Accompanying view shows one of eight horizontal shaft "SMITH" Turbine units in successful operation in the Cornell Wood Products Co. mill at Cornell, Wis. Each unit develops 1550 H.P. under 37' 6" head.

FOR STABILITY AND EFFICIENCY SMITH TURBINES ARE UNEXCELLED

If interested, write for Bulletin "S"

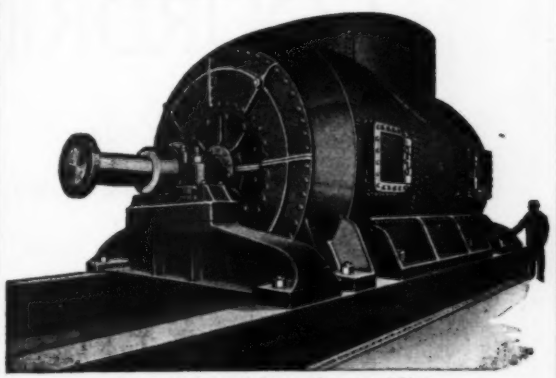
S. MORGAN SMITH CO., York, Pa.

BRANCH OFFICES:
176 Federal St. BOSTON
76 W. Monroe St. CHICAGO
405 Power Bldg. MONTREAL

Leffel Turbine Water Wheels

High Speed — High Horsepower — High Efficiency

Vertical and Horizontal Designs



Large Horizontal Direct Connected Unit

Write for Bulletin 54

The JAMES LEFFEL & CO.
SPRINGFIELD, OHIO

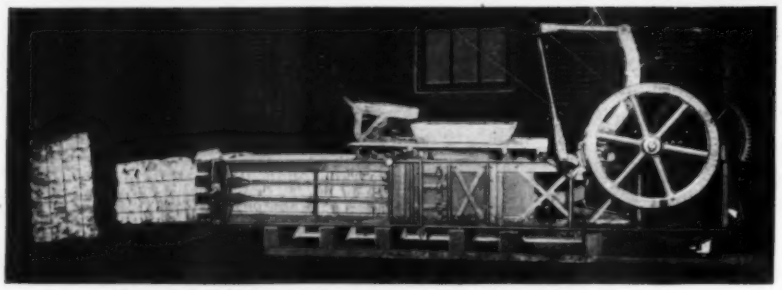
Boston Office: Room 610 Compton Bldg., 161 Devonshire Street, Boston, Mass.

SALES ENGINEERS

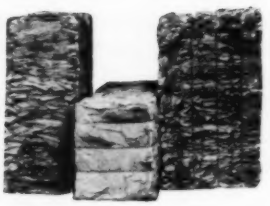
B. F. Groff, 558 Woolworth Bldg., Lancaster, Pa.
H. H. White, 1503 Fourth Nat'l Bank Bldg., Atlanta, Ga.
William Hamilton Co., Ltd., Peterboro, Ont., Canada

The FAMOUS *OHIO* BALING PRESS

"Judged by the Companies it Serves"



Famous Ohio Baling Press operating in the plant of a well-known paper company in Cleveland, Ohio. One man operating this machine now bales in an hour the same amount of scrap that previously required the services of two men all day on a vertical type press.



Note the smooth, neat, compact bales produced by the Famous Ohio. Easily handled without falling apart. Tight bales require less storage space and allow the loading of trucks and cars to full weight capacity.

The famous Ohio Continuous Duty Baling Press is the world's leading machine for the salvage of such materials as paper, rags, light sheet metal, excelsior, corrugated and solid cardboard, shavings, or any other compressible waste products.

It is used by hundreds of nationally known companies such as Thompson & Norris Co., Robert Gair Co., and the Curtis Publishing Company. These know it to be a giant for strength, a demon for speed, and a mechanical masterpiece.

We will send you full particulars on request.

The OHIO CULTIVATOR CO.
BELLEVUE, OHIO

FAMOUS **Ohio** **BALING PRESS**

FOURDRINIER WIRES

Dandy Rolls *Cylinder Molds*
Brass, Copper and Iron Cloth
Bank and Office Railings

WIRE SIGNS

Cheney Bigelow Wire Works
Established 1842 SPRINGFIELD, MASS.

pkgs. from Copenhagen; A. Frankan & Co., 2 cs. from Hamburg; A. Reinhardt & Bro., 8 cs. from Hamburg; H. Kayser & Co., 45 cs. from Havre; American Express Co., 8 cs. from Havre; Bendix Paper Co., 188 cs. from Hamburg; Meckelburg Specialty Co., 9 cs. from Hamburg; Bernard, Judae & Co., 9 cs. from Hamburg; Mansell, Hunt & Catty, 3 cs. from London; Snows, Ltd., 3 cs. from Havre; Guaranty Trust Co., 3 cs. from Havre, 35 cs. from Batavia, 2 cs. from Hamburg; G. Lueder & Co., 6 cs. from Havre; A. L. Diament & Co., 5 cs. from Havre; Globe Shipping Co., 111 cs. from Hamburg; N. V. Handelsoerg, 14 cs. from Rotterdam; Rikkers Bros., 3 cs. from Rotterdam; Wolf Bros., 10 bls. from Havre; Hensel, Bruckmann & Lorbacher, 4 cs. from Havre; Prager Co., 14 cs. from Hamburg; Knauth, Nachod & Kuhne, 14 cs. from Hamburg; J. W. Hampton, Jr., & Co., 12 cs. from Hamburg; C. A. Johnson & Co., 34 bls. from Liverpool; Defiance Mfg. Co., 2 cs. from London; C. B. Stone & Co., 80 cs. from Catalina; Lamport & Holt, 3 cs. from Liverpool; Japan Paper Co., 30 cs. from Havre, 12 cs. from Barcelona; Arthur & Co., 2 cs. from Havre; Baldwin Universal Construction Co., 15 cs. from Rotterdam; Irving National Bank, 8 cs. from Antwerp; Meadows, Wye & Co., 13 cs. from Havre.

Foreign Trade Opportunities

A manufacturer in Argentina desires to purchase paper board boxes suitable for packing crown bottle corks for shipment. Full information and prices should be given. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 33311.

A commercial agent in Mexico desires to secure an agency for the sale of wood pulp. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 33337.

A printing establishment in Mexico desires to purchase various quantities and qualities of print paper, book paper, job prining paper, bookbinders' supplies, etc. Quotations should be given c.i.f. Mexican port. Payment to be by draft against documents. Correspondence may be in English. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 33345.

A manufacturing company in Australia desires to purchase automatic and semiautomatic cardboard box making machinery. Payment to be made against letter of credit. Reference. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 33394.

PERKINS

Guaranteed Calender Rolls

All are fitted with PERKINS PATENTED SPLINE, which prevents slipping or turning on the shaft.

The superior finishing surface of PERKINS ROLLS has been a recognized fact for more than thirty years.

Let us tell you more about them.

B. F. PERKINS & SON, Inc.

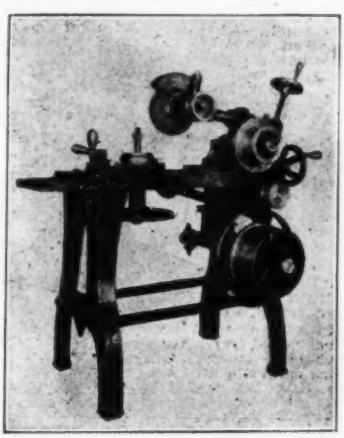
Holyoke, Mass.

The Best Grinder

The Standard Koegel

Save money by sharpening your own knives

Costs less to do it yourself and you get better work and more of it if you use only sharp cutters.



GIBBS-BROWER CO.

SOLE AGENTS

261 BROADWAY NEW YORK CITY

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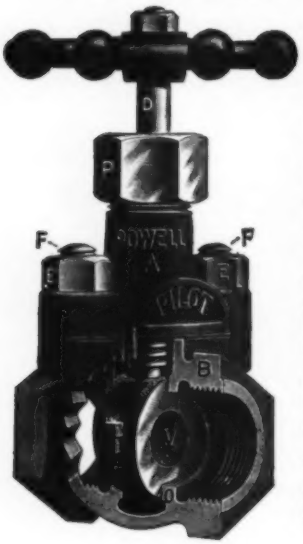
POWELL VALVES
FOR EVERY PURPOSE



Five Points of Efficiency Combined in the Powell "Pilot" Gate Valve

¶ 1. Body and bonnet cast of a close grained iron of high tensile strength.

¶ 2. Made with bronze trimmings when required for medium steam pressure.

¶ 3. The double disc—not a wedge disc, but two discs with ball and socket back, smooth working and self-adjusting.

¶ 4. Made in all iron for cyanide solutions and other acids that attack bronze.

¶ 5. All working parts are made to gauge and are interchangeable.

Ask your dealer for Powell "Pilot" Gate Valves or write us.

Will Be Pleased to Send "Pilot" Gate Valve Circular on Request.

THE WM POWELL CO.
DEPENDABLE ENGINEERING SPECIALTIES
CINCINNATI, O.

THE HILL CLUTCH CO.

Plant and General Office at Cleveland, Ohio

Hill Clutch Equipment for Transmitting Power

In Pulp and Paper Mills

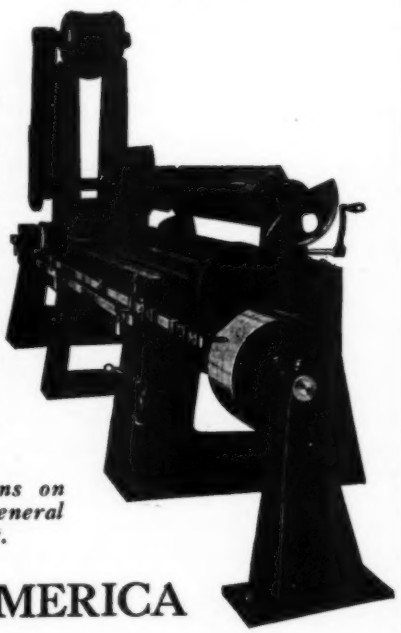
THE HILL CLUTCH CO.
CLEVELAND, OHIO

Scientific Grinding Development

A Machine for Every Purpose

Straight Wheel, Cup Wheel, Ring Wheel Grinders. Hand or automatic, wet or dry grinding. Traveling grinding wheel, stationary work, or stationary grinding wheel, traveling work.

Full automatic, adapted for every variety of grinding service in scientifically fitting knives, saws, shear blades, etc.



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BIG RAPIDS, MICH., U. S. A.

Branch:* 304 *First Ave., South, Seattle, Wash.

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

ADHESIVES
E. F. Russ Co., 201 Devonshire St., Boston, Mass.

ACID RESISTING BRONZE
Sandusky Foundry & Machine Co., Sandusky, Ohio.
William A. Hardy & Sons, Fitchburg, Mass.

AGITATOR EQUIPMENT
The Hill Clutch Co., Cleveland, Ohio.
Moore & White Co., Philadelphia, Pa.

AIR CONDITIONING AND CONTROL APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.

ANGLE VALES
The Crane Company, Chicago, Ill.

ARCHITECTS
James L. Carey, 208 N. Laramie St., Chicago.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
George F. Hardy, 309 Broadway, New York City.

ASSORTING TABLES
Moore and White Co., Philadelphia, Pa.

ASH CONVEYOR SYSTEMS
American Steam Conveyor Corp., Chicago, Ill.

BALING PRESSES
Ohio Cultivator Co., Belleville, O.

BARKERS
Carthage Machine Co., Carthage, N. Y.
Holyoke Machine Co., Holyoke, Mass.
Union Iron Works, Bangor, Me.
Valley Iron Works Co., Appleton, Wis.

BARK SHREDDERS
The Jeffrey Mfg. Co., Columbus, O.

BEATER BARS
John W. Bolton & Sons, Inc., Lawrence, Mass.
Simonds Manufacturing Co., Fitchburg, Mass.

BEATER BED PLATES
John W. Bolton & Sons, Inc., Lawrence, Mass.
Simonds Manufacturing Co., Fitchburg, Mass.

BEATER ROLL FILLING
John W. Bolton & Sons, Inc., Lawrence, Mass.
Simonds Manufacturing Co., Fitchburg, Mass.

BEATING, WASHING AND BLEACHING ENGINES
Dayton Beater & Hoist Co., Dayton, Ohio.
Holyoke Machine Co., Holyoke, Mass.
Noble & Wood Machine Co., Hoosick Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

BEATERS (Continuous)
Claflin Engineering Co., Lancaster, Ohio.
The Griley-Unkle Eng. Co., Ft. Wayne, Ind.
Bird Machine Co., East Walpole, Mass.

BELTING (Rubber)
United States Rubber Co., New York and Chicago

BELT CONVEYORS
The Jeffrey Mfg. Co., Columbus, O.
Robins Conveying Belt Co., New York City.

BELT DRIVES
The Hill Clutch Co., Cleveland, Ohio.
The Link Belt Co., Chicago, Ill.

BLEACHING (Propellers)
Moore and White Co., Philadelphia, Pa.

BLANKETS
Frank F. Alt., 421 Columbia St., La Fayette, Ind.

BLOWERS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

BOARD MACHINES
Beloit Iron Works, Beloit, Wis.
Valley Iron Works, Appleton, Wis.
Grasselli Chemical Co., Cleveland, Ohio.
A. Klipstein & Co., 644 to 652 Greenwich St., New York City.

DYNAMOS
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

BOARDS (Straw)
The C. L. La Boiteaux Co., Cincinnati, O.

BOILERS
J. F. Davis, Chicago.

BOILER FEEDER
The Farnsworth Co., Conshohocken, Pa.

BOILER SETTINGS
McLeod & Henry Co., Troy, N. Y.

BRASS TUBES
Wheeler Condenser & Engineering Co., Carteret, N. J.

BRASS WIRE CLOTH
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Lindsay Wire Weaving Co., Cleveland, Ohio.
W. S. Tyler Co., Cleveland, Ohio.

BROKERS & FORWARDING AGENTS
Parsons Trading Co., 17 Battery Place, N. Y. C.

BRIMSTONE
Union Sulphur Co., 17 Battery Place, New York City.

BRONZE CASTINGS
Eastwood Wire Mfg. Co., Columbus, O.

BRONZE JACKETS
Sandusky Foundry & Machine Co., Sandusky, Ohio.

BUNDLING SYSTEMS
Signode System, Lake St., Chicago

CALENDERS
Beloit Iron Works, Beloit, Wis.
Holyoke Machine Co., Holyoke, Mass.

CALENDER DOCTORS
Ticonderoga Machine Works, Ticonderoga, N.Y.

CALENDER ROLLS
Holyoke Machine Co., Holyoke, Mass.
B. F. Perkins and Son, Inc., Holyoke, Mass.

CASEIN
J. A. & W. Bird & Co., 88 Pearl St., Boston, Mass.
The Kalbfleisch Corp., 31 Union Square, N. Y. C.

CAST IRON PIPE
U. S. Cast Iron Mfg. Co., Pittsburgh, Pa.
Cast Iron Publicity Bureau, New York City.
Glamorgan Pipe & Foundry Co., Lynchburg, Va.

CAUSTICIZING APPARATUS
Glamorgan Pipe & Foundry Co., Lynchburg, Va.

CENTRIFUGAL PUMPS
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Glamorgan Pipe & Foundry Co., Lynchburg, Va.
Valley Iron Works Co., Appleton, Wis.
Wheeler Condenser & Engineering Co., Carteret, N. J.

CHEMICALS
Eastern Paper Makers' Chemical Co., Watertown, N. Y.
The Grasselli Chemical Co., Cleveland, Ohio.
A. Klipstein & Co., 644 to 652 Greenwich St., New York City.
Paper Makers' Chemical Co., Easton, Pa., and Holyoke, Mass.
Mathieson Alkali Works, Inc., New York City.
Western Paper Makers' Chemical Co., Kalamazoo, Mich.

CHIP CRUSHERS
Carthage Machine Co., Carthage, N. Y.

CHIPPERS
Holyoke Machine Co., Holyoke, Mass.
Union Iron Works, Bangor, Me.
Valley Iron Works Co., Appleton, Wis.

CHIPPER AND BARKER KNIVES
John W. Bolton & Sons, Inc., Lawrence, Mass.
Simonds Manufacturing Co., Fitchburg, Mass.

CHIP SCREENS
Carthage Machine Co., Carthage, N. Y.

CLAYS AND FILLERS
Binney & Smith Co., 81 Fulton St., N. Y. C.
J. A. & W. Bird & Co., 88 Pearl St., Boston, Mass.
Daniel M. Hicks, 200 Fifth Ave., New York City.
Eastern Paper Makers' Chemical Co., Watertown, N. Y.
International Pulp Co., 41 Park Row, N. Y. C.
Miner-Edgar Co., 110 William St., N. Y. C.
Paper Makers' Chemical Co., Easton, Pa., and Holyoke, Mass.
The John W. Higman Co., Inc., 29 Broadway, New York City.
R. T. Vanderbilt Co., 50 E. 42nd St., New York City.
Western Paper Makers' Chemical Co., Kalamazoo, Mich.

COAL BUNKERS
The Brownhoist Co., Cleveland, Ohio.
The Jeffrey Mfg. Co., Columbus, O.

COAL & ASH HANDLING SYSTEMS
Godfrey Conveyor Co., 119 13th St., Elkhart, Ind.
The Jeffrey Mfg. Co., Columbus, O.

COATED PAPERS
Bardeen Paper Co., Otsego, Mich.
Bermingham & Prosser, Chicago, Ill.
Seaman Paper Co., Chicago, Ill.

CONDENSING EQUIPMENT
Wheeler Condensing & Engineering Co., Carteret, N. J.

CONSTRUCTION (Building)
The Aladdin Co., Bay City, Mich.

CONSULTING ENGINEERS
James L. Carey, 208 N. Laramie St., Chicago, Ill.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
George F. Hardy, 309 Broadway, New York City.

CONSULTING ENGINEERS (Power)
J. F. Carrigan Engineering Co., 504 Cunard Bldg., Chicago.

CONVEYORS
Godfrey Conveyor Co., 119 13th St., Elkhart, Ind.
The Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., Chicago, Ill.
Portable Machine Co., Passaic, N. J.
Robins Conveying Belt Co., New York City.

COOLING TOWERS
Wheeler Condenser & Engineering Co., Carteret, N. J.

COPPER TUBES
Wheeler Condenser & Engineering Co., Carteret, N. J.

CRANES
The Brownhoist Co., Cleveland, Ohio.
John F. Byers Co., Ravenna, Ohio.
Northern Engineering Works, Detroit, Mich.
The Chisholm-Moore Mfg. Co., Cleveland, O.
The Link Belt Co., Chicago, Ill.

CRUSHERS (Coal)
The Jeffrey Mfg. Co., Columbus, O.

CYLINDER MOLDS
Appleton Wire Works, Appleton, Wis.
Beloit Iron Works, Beloit, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
The Lindsay Wire Weaving Co., Cleveland, O.
Joseph O'Neill Wire Works, Southport, Conn.
The W. S. Tyler Co., Cleveland, Ohio.

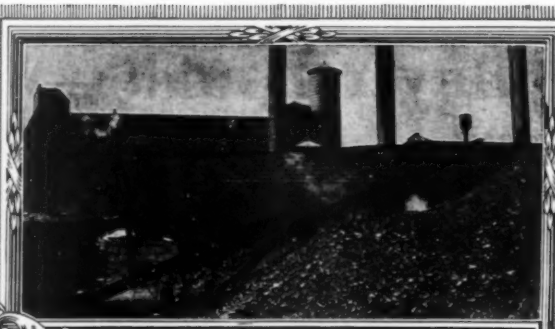
DANDY ROLLS
Appleton Wire Works, Appleton, Wis.
Central Mfg. Co., Kalamazoo, Mich.
Cheney Bigelow Wire Works, Springfield, Ohio.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, Ohio.
The W. S. Tyler Co., Cleveland, Ohio.

DECKEL FRAME SUPPORTS
Husband & Nash, Menasha, Wis.

DRUM WINDERS
Beloit Iron Works, Beloit, Wis.
Ticonderoga Machine Co., Ticonderoga, N. Y.

DRYER FELTS
Albany Felt Co., Albany, N. Y.
Appleton Woolen Co., Appleton, Wis.
F. C. Huyck & Sons.
Shuler and Benninghofen, Hamilton, Ohio.

DYESTUFFS
Binney & Smith, 81-83 Fulton St., N. Y. City.
E. I. Du Pont de Nemours & Co., Wilmington, Del.



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A Convenient and Flexible Machine for Loading, Unloading or Transferring Coal, Coke, Ashes, Sand, Earth, Gravel or Similar Materials.

Saves 6 to 12 Men

AND KEEPS EQUIPMENT MOVING

Over 2,000 Users

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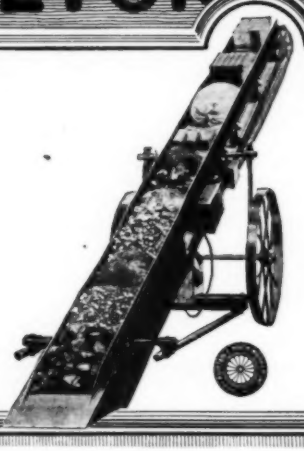


The "SIMS" Open Feed WATER HEATER, FILTER & PURIFIER

WHEN you buy a water heater, or anything else for that matter, you do not actually buy a water heater, but what it will do.

"SIMS" Open Feed Water Heater, Filter and Purifier is the product of Modern Engineering Science and has met the demand for greater efficiency.

OPEN FEED construction is the most simple and effective principle of feed water heating and has less maintenance troubles and operating costs than any other type.

WATER HEATER feeds your boilers with hot water, reduces the strain from contraction and expansion due to feeding cold water and effects a saving of approximately 14.5% in fuel.

FILTER and PURIFIER the feed water in a filtering chamber containing hard coke of suitable size as the filtering medium.

Water containing earthy matter and carbonate of lime when heated close to the boiling point is thrown out of solution into suspension and is removed by the filter.

Is installed you GET the service you bought

Ask us about the "Sims" feed-water heaters.

THE SIMS COMPANY

"We Keep Others in Hot Water."

ERIE PENNA.

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

DUST COLLECTING SYSTEMS
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.

ELECTRIC HOISTS
John F. Byers Machine Co., Ravenna, Ohio.
Link-Belt Co., Chicago, Ill.
Northern Engineering Co., Detroit, Mich.

ELECTRIC MACHINERY
Westinghouse Elec. & Mfg. Co. East Pittsburgh, Pa.

ELEVATORS
The Jeffrey Mfg. Co., Columbus, O.

ELEVATORS (Portable)
The Jeffrey Mfg. Co., Columbus, O.

ENGINES
Ball Engine Co., Erie, Pa.
The Brownell Co., Dayton, O.
Chandler and Taylor, Indianapolis, Ind.

ENGINEERS
James L. Carey, 208 North Laramie St., Chicago, Ill.
John F. Carrigan, Chicago, Ill.
George F. Hardy, 309 Brodway, New York City.
Hardy S. Ferguson, 200 Fifth Ave., New York City.
Stebbins Engineering & Mfg. Co., Watertown, N. Y.

ENGINEERS (Testing)
Widney Test Laboratories, Chicago, Ill.

EVAPORATORS:
Buffalo Foundry & Machine Co., Buffalo, N. Y.
Charles Ordway, 25 Church St., N. Y. City.
Swenson Evaporator Co., Chicago, Ill.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Zaremba Co., Buffalo, N. Y.

EXHAUSTERS
Glamorgan Pipe & Foundry Co., Lynchburg, Va.

FANS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

FELTS AND JACKETS
Albany Felt Co., Albany, N. Y.
Appleton Woolen Co., Appleton, Wis.
F. C. Huyck & Sons, Albany, N. Y.
Lockport Felt Co., Newfane, N. Y.
Shuler and Benninghofen, Hamilton, Ohio.

FELT AND WIRE GUIDES
Huband and Nash, Menasha, Wis.
Moore & White Co., Philadelphia, Pa.

FIBROUS PEARL FILLER
Eastern Paper Makers' Chemical Co., Watertown, N. Y.
Paper Makers' Chemical Co., Easton, Pa., and Holyoke, Mass.
Western Paper Makers' Chemical Co., Kalamazoo, Mich.

FILTER (Continuous Suction)
Glamorgan Pipe & Foundry Co., Lynchburg, Va.

FILTERS (Pressure and Gravity)
Graver Corporation, East Chicago, Ind.
Hungerford & Terry, Inc., Philadelphia, Pa.

FIRE BRICK
Oliver Bros., 97 Warren St., New York City.

FOURDRINIER WIRES
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, Ohio.
Joseph O'Neill Wire Works, Southport, Conn.
The W. S. Tyler Co., Cleveland, Ohio.

FRICTION CLUTCHES
The Hill Clutch Co., Cleveland, Ohio.
Moore and White Co., Philadelphia, Pa.

FURNACE ARCHES
McLeod & Henry Co., Troy, N. Y.

FUSES
Economy Fuse & Mfg. Co., Kinzie and Orleans Sts., Chicago, Ill.

GEARS
The Hill Clutch Co., Cleveland, Ohio.

GLUES
E. F. Russ Co., 201 Devonshire St., Boston, Mass.

GRINDERS
Holyoke Machine Co., Holyoke, Mass.
Valley Iron Works, Appleton, Wis.

HEATERS (Feed Water)
Graver Corporation, East Chicago, Ind.
The Sims Co., Erie, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.

HOISTING AND CONVEYING SYSTEMS
John F. Byers Machine Co., Ravenna, Ohio.
The Chisholm-Moore Mfg. Co., Cleveland, Ohio.
The Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., Chicago, Ill.
Northern Engineering Co., Detroit, Mich.
Robins Conveying Belt Co., New York City.

HOSE
United States Rubber Co., Chicago, Ill.

HYDRAULIC TURBINES
Holyoke Machine Co., Holyoke, Mass.
James Leffel and Co., Springfield, Ohio.
S. Morgan Smith Co., York, Pa.

INSTRUMENTS (Testing)
Widney Test Laboratories, Chicago, Ill.

IRON CASTINGS
Beloit Iron Works, Beloit, Wis.
Valley Iron Works Co., Appleton, Wis.

JORDAN FILLINGS
J. W. Bolton & Sons, Inc., Lawrence, Mass.

KNIVES
E. C. Atkins & Co., Indianapolis, Ind.
John W. Bolton & Sons, Inc., Lawrence, Mass.
Simonds Manufacturing Co., Fitchburg, Mass

LAYBOYS
Moore and White Co., Philadelphia, Pa.

KNIFE GRINDING MACHINERY
Machinery Co. of America, Big Rapids, Mich.

LIGHTING EQUIPMENT
Benjamin Electric Co., Chicago, Ill.

LINE SHAFT BEARINGS
The Hill Clutch Co., Cleveland, Ohio.

MACHINE DRYER TEMP. CONTROL
Open Coil Heater and Purifier Co., Indianapolis, Ind.
Valley Iron Works, Appleton, Wis.

MAGNETIC PULLEYS
Magnetic Mfg. Co., 766 Windlake Ave., Milwaukee, Wis.

MECHANICAL DRAFT APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

MECHANICAL PULP
J. Andersen & Co., 21 E. 40th St., New York City.

MECHANICAL STOKERS
Sanford Riley Stoker Co., Worcester. Mass.

METERS (Gasoline)
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

MILL ARCHITECTS
Stebbins Engineering & Mfg. Co., Watertown, N. Y.

MOISTURE TESTER
Williams Apparatus Co., Watertown, N. Y.

MOTORS
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

OIL FILTRATIONS & CIRCULATING SYSTEMS
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

OIL HANDLING AND STORING EQUIPMENT
The Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

PAINTS
Cheesman-Elliot Co., Inc., Brooklyn, N. Y.
Detroit Graph te Co., Detroit, Mich.
The Tropical Paint & Oil Co., Cleveland, O.

PAPER BOARDS
The C. L. La Boiteaux Co., 200 Fifth Ave., N. Y.
Strehl Otens Co., Inc., New York-Chicago.

PAPER CUTTERS & SLITTERS
Beloit Iron Works, Beloit, Wis.
Hamblet Machine Co., Lawrence, Mass.

PAPER DISTRIBUTORS
Bermingham and Prosser, Chicago, Ill.
H. G. Craig & Co., New York City.
Berton C. Hill Co., New York City.
Maurice O'Meara, New York City.
Seaman Paper Co., Chicago, Ill.

PAPER EXPORTERS AND IMPORTERS
Gatti-McQuade Co., 200 Fifth Ave., New York City.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Main Paper Stock Co., 23-31 Peck Slip, New York City.
New York Overseas Co., 17 Battery Place, New York City.
Interstate Pulp and Paper Co., Grand Central Bldg., New York City.
Lagerloef Trading Co., 18 E. 41st St., N. Y. C.
Parsons Trading Co., 17 Battery Place, N. Y. C.

PAPER MACHINES
Beloit Iron Works, Beloit, Wis.

PAPER MANUFACTURERS
American Writing Paper Co., Holyoke, Mass.
Bardeen Paper Co., Otsego, Mich.
Eastern Manufacturing Co., 501 Fifth Ave., N. Y. City.
Hammermill Paper Co., Erie, Pa.
Lincoln Paper Mills, Elkhart, Ind.
Marathon Paper Co., Rothschild, Wis.
Munising Paper Co., Munising, Mich.
Northern Paper Mills, Green Bay, Wis.
Oxford Paper Co., 200 Fifth Ave., N. Y. City.
State Pulp & Paper Co., New York City.
Wausau Sulphate Fibre Co., Mosinee, Wis.
Wolverine Paper Co., Otsego, Mich.

PAPER MANUFACTURERS' SUPPLIES
J. Andersen & Co., 21 East 40th St., New York City.
The Robert Andrews Co., 115-117 Franklin St., New York City.
Vito G. Cantasano & Bros., 185 South St., New York City.
Craig-Becker Co., 52 Vanderbilt Ave., N. Y. City.
Eastern Paper Makers' Chemical Co., Watertown, N. Y.
Francis Hughes Co., 21st St. and Loomis Ave., Chicago.
Invincible Paper & Pulp Corporation, 135 Broadway, N. Y. City.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
Martin Spinelli, 132 Nassau St., New York City.
Main Paper Stock Co., 25-31 Peck Slip, New York City.
Mendelson Bros. Paper Stock Co, 910 Michigan Ave., Chicago.
New York Overseas Co., Inc., 17 Battery Place, New York City.
Paper Makers' Chemical Co., St. Austell, England.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
A. Salomon, Inc., New York City.
Salomon Bros. & Co., 200 Fifth Ave., N. Y. C.
Spinelli, Martin, Brooklyn, N. Y.
Steele By-Products Co., Chicago.
Western Paper Makers' Chemical Co., Kalamazoo, Mich.

PAPER MILL BROKERS
Gibbs-Brower Co., 261 Broadway, N. Y. C.

PAPER STOCK CUTTERS
Taylor, Stiles & Co., Riegelsville, N. J.

PAPER AND PULP MILL MACHINERY
Beloit Iron Works, Beloit, Wis.
The Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.

PAPER TESTERS
Widney Test Laboratories, Chicago, Ill.

HIGH SPEED BELTING

VOORHEES RUBBER M'F'G CO

VOORHEES SENSATION

APTLY NAMED, as it may be,

"Sensation" Belting is not an accidental discovery.

NOTHING ORDINARY OCCURS IN ITS MAKE-UP.

The approaches to this type are a few, maybe, but **none have arrived** at such stage of compounding and constructive **perfection.**

Adapted to **every** drive its scope is wide—belongs where Leather isn't just right and where Rubber Belt is consistently rejected.

"SENSATION" stands unmatched
In tensile strength,
Flexible, compact, inseparable plies.
Pulley contact never secured in rubber.
Positive absence of stretch.
Frictional heat resistance and influence of climatic variations.
Sold—not as a mere business transaction, but **as a SERVICE!**

Made only by

VOORHEES RUBBER MANUFACTURING COMPANY, JERSEY CITY, N. J.

Home of "Rub-Steel"—"The Valve with a Backbone" *New York Office, 30 Reade Street*

'Boys, This Will Pay Our Salaries!"

This is what the General Manager of one of the largest paper mills in this country said to the Superintendent and Boss Machine-tender after installing a

WILLIAMS STANDARD PAPER MOISTURE TESTER

Was He Right?

Figure it out. You know your production. If you are shipping out your paper 2 or 3 per cent too dry, figure your loss in tonnage to which you are entitled. (Tests at one mill showed a variation of 8% in moisture content.)

Other losses are:

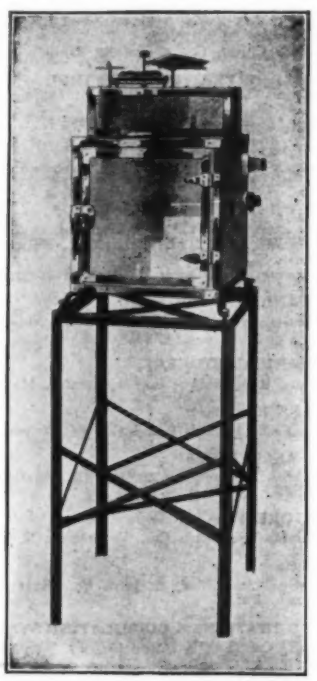
Fuel loss in over-drying.

Production loss due to more breaks in over-dry paper.

Is over-dry paper more satisfactory to your customer? NO.

WILLIAMS APPARATUS CO.

Send today for descriptive matter



Description

A compact apparatus which will give you in 10 minutes the exact moisture of content of your paper as it comes off the machine.

Accurate to .1 of 1%.

No special skill required to operate. Anyone who can weigh roll paper or get the base weight of a sample can operate it.

Double walled electric oven with thermostat control, accurate scales, with beam graduated to read % of moisture directly. No calculation required.

Tests all kinds of paper from tissue to board.

PARK PLACE **Watertown, N. Y.**

Every Paper Mill Can Profitably Use One or More of These Outfits. In Some Mills, One Will PAY FOR ITSELF IN ONE DAY.

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

PARCHMENT MANUFACTURERS
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Sutherland Paper Co., Kalamazoo, Mich.

PIPE BENDING
American Pipe Bending Co., Boston, Mass.

PIPING EQUIPMENT
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.

PIPING SYSTEMS INSTALLED
Pittsburgh Piping & Equip. Co., Pittsburgh, Pa.

PLUG MACHINES
Carthage Machine Co., Carthage, N. Y.

PNEUMATIC CHIP HANDLING SYSTEMS
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.

POWER INSTRUMENTS
The Manning Gauge Co., Inc., 77 Traverse St., Boston, Mass.

POWER TRANSMISSION
Dodge Sales & Engineering Co., Mishawaka, Ind.
Link-Belt Co., Chicago, Ill.
The Hill Clutch Co., Cleveland, Ohio.
Valley Iron Works, Williamsport, Pa.

PUBLISHERS
The Chemical Catalog Co., New York City.

PULP (Chemical)
J. Andersen & Co., 21 East 40th St., New York City.
Craig-Becker Co., 52 Vanderbilt Ave., N. Y. City.
M. Gottesman & Co., 18 E. 41st St., New York City.
Daniel M. Hicks, 200 Fifth Ave., New York City.
E. J. Keller Company, 200 Fifth Ave., N. Y. C.
New York Overseas Co., Inc., 17 Battery Place, New York City.
Price & Pierce, Ltd., 30 East 42nd St., New York City.
The Pulp & Paper Trading Co., 21 East 40th St., New York City.
Scandinavian-American Trading Co., 50 East 42d St., New York City.
Lagerloef Trading Co., 18 E. 41st St., N. Y. C.

PULP EXTRACTORS
The Griley-Unkle Eng. Co., Ft. Wayne, Ind.

PULP AND PAPER MACHINERY
Beloit Iron Works, Beloit, Wis.
Bird Machine Co., East Walpole, Mass.
Carthage Machine Co., Carthage, N. Y.
Glens Falls Machine Co., Glens Falls, N. Y.
Moore & White Co., Philadelphia, Pa.
Union Iron Works, Bangor, Me.
Valley Iron Works, Appleton, Wis.

PULP GRINDERS
Carthage Machine Co., Carthage, N. Y.
Union Iron Works, Bangor, Me.

PULP MILL BROKERS
Gibbs-Brower Co., 261 Broadway, N. Y. C.

PULP LAP SHREDDERS
The Jeffrey Mfg. Co., Columbus, O.

PULP SHREDDERS
Carthage Machine Co., Carthage, N. Y.

PUMPS (Stock)
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.
Carthage Machine Co., Carthage, N. Y.
Glens Falls Machine Co., Glens Falls, N. Y.

PUMPS (Centrifugal)
Wheeler Condenser & Engineering Co., Carteret, N. J.

PUMPS (Deep Well)
Gregg Pump Co., Kansas City, Mo.

PUMPS (Gasoline)
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

PUMPS (Vacuum)
American Steam Pump Co., Battle Creek, Mich.
Buffalo Foundry and Machine Co., Buffalo, N. Y.
Dean Bros., Indianapolis, Ind.
Wheeler Condenser & Engineering Co., Carteret, N. J.

RAG AND PAPER DUSTERS
Holyoke Machine Co., Holyoke, Mass.

RAG CUTTERS
B. F. Perkins & Son, Inc., Holyoke, Mass.

REFLECTORS
Benjamin Electric Co., Chicago, Ill.

ROTARY VACUUM PUMPS
Sandusky Foundry & Machine Co., Sandusky, O.

RUBBER ROLLS
United States Rubber Co., New York and Chicago

ROTARY SCREEN
Bird Machine Co., East Walpole, Mass.

SAVE-ALLS
Bird Machine Co., East Walpole, Mass.
Glens Falls Machine Co., Glens Falls, N. Y.

SAWS
E. C. Atkins & Co, Indianapolis, Ind.
Simonds Manufacturing Co., Fitchburg, Mass.

SCREENS
Bird Machine Co., East Walpole, Mass.
Shartle Bros. Mach. Co., Middletown, O.
Union Iron Works, Bangor, Me.

SCREEN PLATES
Central Mfg. Co., Kalamazoo, Mich.
William A. Hardy & Sons, Fitchburg, Mass.

SCREEN DIAPHRAGMS
United States Rubber Co., Chicago, Ill.

SHAKE (Fourdrinier Cushion)
Wm. C. Nash, Neenah, Wis.

SHOWER PIPES
Sandusky Foundry and Machine Co., Sandusky, Ohio.

SILENT CHAIN DRIVES
The Link Belt Co., Chicago, Ill.

SIZING SYSTEMS
Eastern Paper Makers' Chemical Co., Watertown, N. Y.
Paper Makers' Chemical Co., Easton, Pa., and Holyoke, Mass.
Process Engineers, New York City.
Western Paper Makers' Chemical Co., Kalamazoo, Mich.

SLITTING AND REWINDING MACHINERY
Beloit Iron Works, Beloit, Wis.
Cameron Machine Co., Poplar St., Brooklyn, N. Y.
Hamblet Machine Co., Lawrence, Mass.
Samuel M. Langston Co., Camden, N. J.

SOOT BLOWERS
Diamond Power Specialty Co., Detroit, Mich.

SPEED CHANGES
Moore and White Co., Philadelphia, Pa.

STEAM JET CONVEYORS
American Steam Conveyor Corp., Chicago, Ill.

STOCK CIRCULATING SYSTEM
Claflin Engineering Co., Lancaster, Ohio.
Ticonderoga Machine Works, Ticonderoga, N.Y.

STOCK PUMPS
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.

SUCTION ROLLS
Sandusky Foundry and Machine Co., Sandusky, Ohio.

SULPHITE MACHINERY
Stebbins Engineering Co., Watertown, N. Y.

SULPHUR
Union Sulphur Co., 17 Battery Place, New York City.

SULPHUR BURNERS
Carthage Machine Co., Carthage, N. Y.
Valley Iron Works Co., Appleton, Wis.

TANKS (Oil Storage)
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.
Graver Corporation, East Chicago, Ind.

TANKS (Steel)
Graver Corporation, East Chicago, Ind.

TANKS (Welded)
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

TANKS (Water Storage)
Graver Corporation, East Chicago, Ind.

TESTERS (Moisture)
Williams Apparatus Co., Watertown, N. Y.

TUBING
Wheeler Condensing & Engineering Co., Carteret, N. J.

TURBINES (Hydraulic)
James Leffel and Co., Springfield, Ohio.
S. Morgan Smith Co., York, Pa.

VACUUM SYSTEMS
Open Coil Heater and Purifier Co., Indianapolis, Ind.

VALVES
Carthage Machine Co., Carthage, N. Y.
The Crane Co., Chicago, Ill.
G. M. Davis Regulator Co., 414 Milwaukee Ave., Chicago, Ill.
The Wm. Powell Co., Cincinnati, Ohio.
Voorhees Rubber Mfg. Co., Jersey City, N. J.

VALVES (Strainer)
Bird Machine Co., East Walpole, Mass.

VAPOR ABSORPTION SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

VARIABLE SPEED ENGINES
Ball Engine Co., Erie, Pa.
The Brownell Co., Dayton, Ohio.
Chandler and Taylor, Indianapolis, Ind.

VENTILATING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., 732 Greenbush St., Milwaukee, Wis.
B. F. Perkins & Son, Inc., Holyoke, Mass.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

WASHER WIRES
The W. S. Tyler Co., Cleveland, Ohio.

WASTE PAPER STOCK
Francis Hughes Co., 21st and Loomis Street, Chicago.
Main Paper Stock Co., 23-31 Peck Slip, New York City.
F. G. Marquardt, Inc., 345 Broadway, N. Y. C.
Martin Spinelli, 132 Nassau St., New York City.
Mendelson Bros. Paper Stock Co., 910 S. Michigan Blvd., Chicago, Ill.
Salomon Bros. & Co., 200 Fifth Ave., N. Y. C.

WATCHMAN'S CLOCKS
Chicago Watchman's Clock Works, 1526 Wabash Ave., Chicago.

WATER FILTER
Hungerford & Terry, Inc., Philadelphia, Pa.
Glens Falls Machine Co, Glens Falls, N. Y.

WATER HEATERS:
Graver Corporation, East Chicago, Ill.
The Sims Co., Erie, Pa.

WATERPROOF LINING
The National Waterproofing Co., Philadelphia, Pa.

WATER-SOFTENING AND PURIFYING SYSTEMS
Graver Corporation, East Chicago, Ind.
Wm. B. Scaife and Sons Co., Oakmont, Pa.

WATER WHEELS
James Leffel and Co., Springfield, Ohio.
Holyoke Machine Co., Holyoke, Mass.
S. Morgan Smith Co., York, Pa.

WELDING & CUTTING EQUIPMENT
The Imperial Brass Mfg. Co., 516 So. Racine Ave., Chicago.

WET MACHINES
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Valley Iron Works Co., Appleton, Wis.

WOOD CHIP SHREDDERS
The Jeffrey Mfg. Co., Columbus, O.

WOOD SPLITTERS
Carthage Machine Co., Carthage, N. Y.

WOOD WASHERS
Carthage Machine Co., Carthage, N. Y.

WIRE SIGNS
Cheney Bigelow Wire Works, Springfield, Mass.

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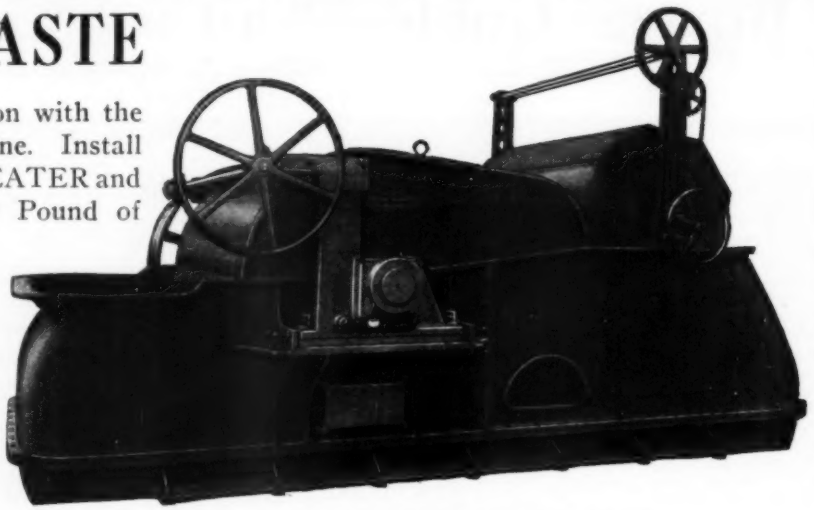

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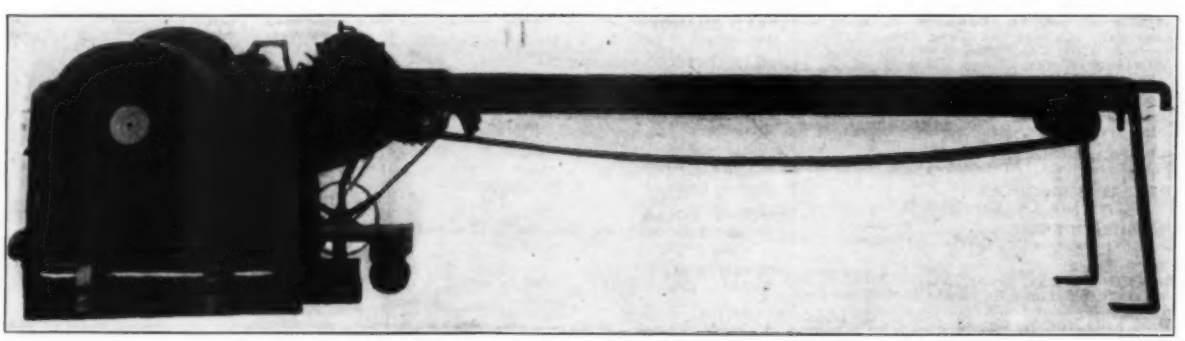

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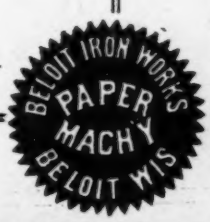
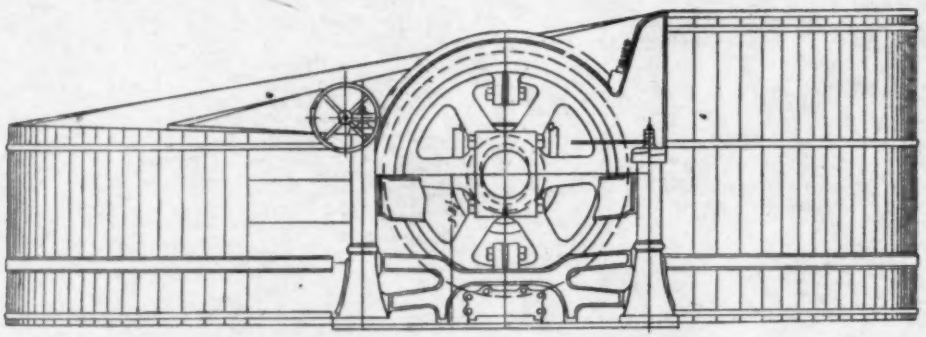


SAVE ON INSTALLATION COST, BEATING TIME, FLOOR SPACE, POWER, MOTORS, BELTING, LABOR



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